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August
1933

First Copy
TECHNOLOGY DEPARTMENT

# Construction Methods

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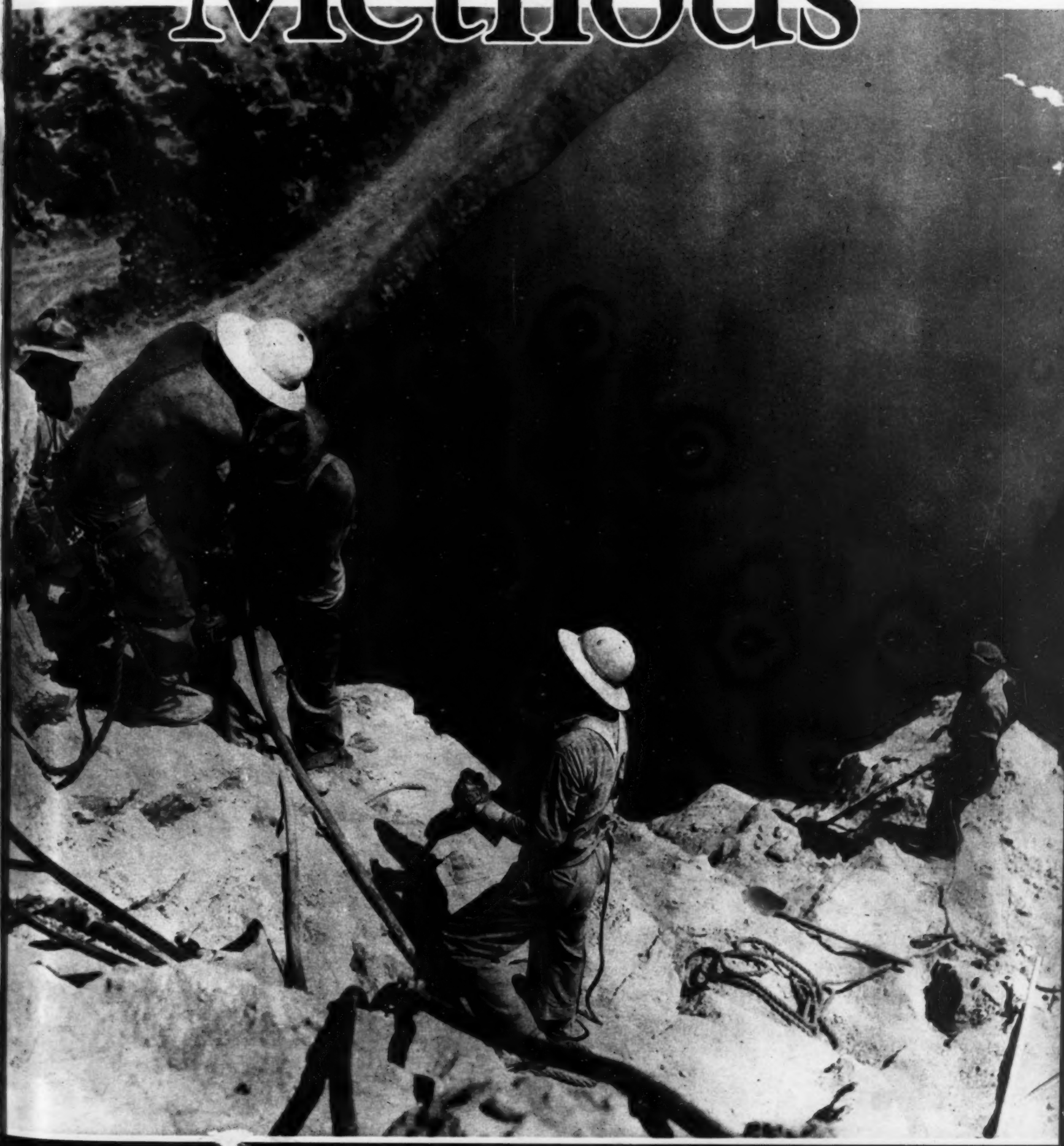
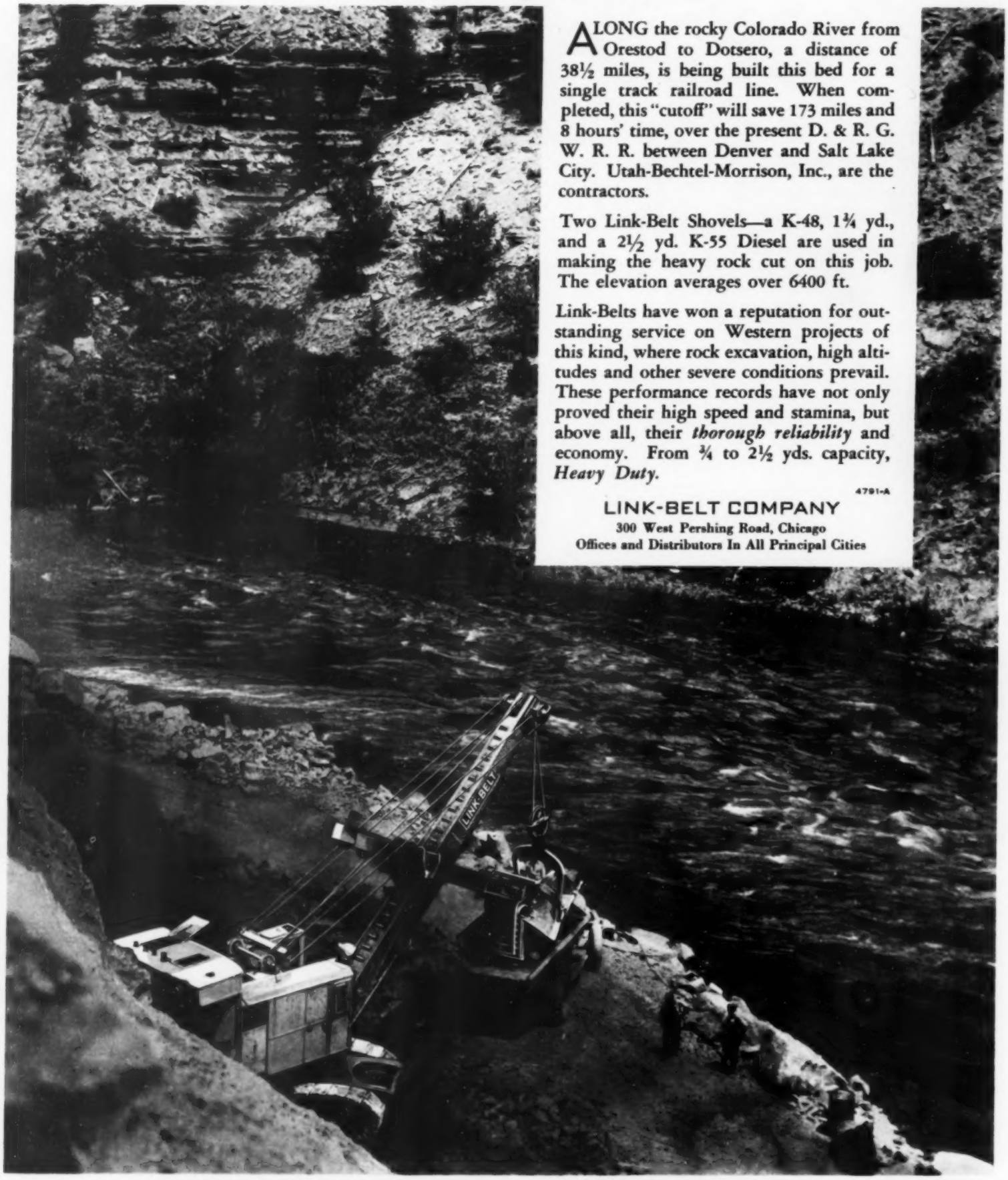


Scaling crew at Boulder Dam removes loose rock from walls of Colorado River Canyon

# Grading for the "Dotsero Cutoff"

## 38½ Miles of Heavy Rock Cut




ALONG the rocky Colorado River from Orestod to Dotsero, a distance of 38½ miles, is being built this bed for a single track railroad line. When completed, this "cutoff" will save 173 miles and 8 hours' time, over the present D. & R. G. W. R. R. between Denver and Salt Lake City. Utah-Bechtel-Morrison, Inc., are the contractors.

Two Link-Belt Shovels—a K-48, 1¼ yd., and a 2½ yd. K-55 Diesel are used in making the heavy rock cut on this job. The elevation averages over 6400 ft.

Link-Belts have won a reputation for outstanding service on Western projects of this kind, where rock excavation, high altitudes and other severe conditions prevail. These performance records have not only proved their high speed and stamina, but above all, their *thorough reliability* and economy. From ¾ to 2½ yds. capacity, *Heavy Duty.*

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TECHNOLOGY DEPT.

# Construction Methods

McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York
ROBERT K. TOMLIN, Editor
*Editorial Staff:* Vincent B. Smith, J. I. Ballard (San Francisco)
Leonard H. Church (Cleveland), Nelle Fitzgerald
WILLARD CHEVALIER, Publishing Director


## A Boom in Road Building

● A boom in road building is under way. To the 48 states has been allotted the $400,000,000 grant authorized in the Recovery Act, with individual amounts ranging from $24,244,024, for Texas, to $1,819,088, for Delaware. While projects in the federal-aid system outside cities are the chief beneficiaries( to the extent of 50 per cent of the funds apportioned) municipalities are to receive not less than 25 per cent for extensions of federal-aid routes within their limits, while secondary or feeder roads will account for the remaining 25 per cent. In addition to spreading work over these three classifications, an equitable geographical distribution is assured by the provision that one or more projects shall be undertaken in at least 75 per cent of all counties of any state. The big job right now is for the states to complete and submit for approval by the U. S. Bureau of Public Roads their plans for putting this money to work, so that contracts in considerable volume may be let without delay.

## Bidding for New Highway Contracts

● Contractors preparing to bid on the large volume of road building involved in the $400,000,000 highway program of the National Recovery Administration should study carefully the rules and regulations governing the conduct of this work before submitting their prices. So many new conditions are imposed that the man who prepares his cost estimates in ignorance of the obligations he must meet is due for a stiff financial jolt.

In the first place, all contracts prescribe minimum rates of wages, predetermined by the state highway departments, for both skilled and unskilled labor. Preference in employing labor must be given to ex-service men with dependents and employees must be secured from designated local agencies of the U. S. Employment Service.

Maximum hours of labor are specified in the form of a 30-hour week, or, in localities where insufficient qualified local labor is available, a 130-hour month. This limit, however, is qualified by permitting a 40-hour week for certain skilled operators of equipment such as power shovels, cranes and paving mixers. It is important to know, in connection with these basic limits on working time, that time lost during one week because of inclement weather or unavoidable delays, may be made up in the succeeding week or weeks of any month.

Another stipulation is that a contractor must do at least 80 per cent of the work with his own forces, a provision aimed at the irresponsible gambler who submits a cut-rate bid in the hope of passing the buck to a group of subcontractors upon whom the thumbscrews of chiseling practises can be applied.

Byck, in the Brooklyn Times Union

## *When the Self-Starter Balks, Use the Crank*

AFTER a discouraging period of confusion and delay at Washington—unavoidable, perhaps, in the economic upheaval which the New Deal has created—organization for the $3,300,000,000 public works program provided for in the National Recovery Act was completed late last month. Machinery has been set up, in the form of regional and state advisors to the Public Works Administration, for examining and approving state and local construction projects throughout the country. The way has been cleared, therefore, for the start of the huge construction program that will produce jobs, by the thousands, both in field and factory, and renew purchasing power on so broad a front that business, generally, should quickly feel its stimulating effects.

If the full benefits of the public works program are to be realized speed in the award of contracts approved by the newly appointed state advisory boards is essential. There has been ample time to demonstrate that the business machine's self-starter doesn't work. Vigorous hand-cranking with the N. R. A. public-works program will get the engine going again.

The possibility of rising prices for material and equipment is one more important factor that the prospective bidder on highway work this year should not neglect. For the road builder the old adage, "Look before you leap," was never more timely than right now.

## For Broader Construction Code

● It now seems probable that the construction industry is to have a master code of fair competitive practice of broader scope than the one initiated by the Associated General Contractors of America and submitted to the National Recovery Administration last month. As the result of a recent meeting at Washington between Malcolm Muir, Deputy Recovery Administrator, and the policy committee of the Construction League of the United States, an affiliation of national associations representing all major operating elements of the construction industry, a revised master code has been drafted by a committee of the League, headed by Stephen F. Voorhees, architect, of New York, to apply to all groups involved in construction, rather than merely to the general contractor group. Such an all-inclusive master code, the committee's first objective, would be supplemented by divisional, local or specialists' codes. On the new code committee architects, engineers, general contractors, road-builders, subcontractors and manufacturers of construction materials are represented. This move toward a single, broad-gage master code for construction embracing "design, construction, assembling, installing and applying of manufactured parts and products, and the supplying of materials," has been made in order to conform with the Recovery Administration's policy of reducing to a minimum the number of individual codes governing major American industries.

## Code Hours and Wages

● The master code for the construction industry, as adopted Aug. 1 and submitted to the National Recovery Administration, outlaws the practice of bid peddling and specifies, unless otherwise established by Government order, a minimum hourly wage of 40 cents, an average work week of 35 hours during any 6-month period, and maximum work periods of 48 hours a week and 8 hours a day. Pending formal hearings at Washington later this month, it is recommended that the provisions of the master code, as submitted, become effective now, in place of the President's blanket agreement for all industries not covered by approved codes. The construction code requirements, however, are not retroactive—they will apply only to new contracts entered into after the approval of the code.

*The full text of the code is given elsewhere in this issue.*

# *Why Shoot the Cow?*

TODAY every thoughtful American is following closely the progress of the National Recovery Administration. Gradually but surely we all have come to see that here is the administration's master-key to recovery, the practical embodiment of the New Deal.

It is natural that in the minds of some there should be confusion, misgiving, hesitation. From the traditional American policy of laissez-faire, individual initiative and enterprise, it seems a far cry to governmental enforcement of wages and working-hours and supervision of prices and profits. Many who are sincerely anxious to cooperate are fearful lest all this cast a fatal blight upon the spirit of private business and industry. Especially is there concern as to the immediate effect of higher production costs without commensurate increase in prices.

We believe that full answer to these misgivings may be read in the facts of our present plight. For three years we have tobogganed down the spiral of diminished buying, production and employment. We have seen a crumbling purchasing power steadily undermine the business and financial structure. For three years we grimly let so-called nature run its course, only to have it drag us closer and closer to the verge of utter collapse and disintegration. Many could tell us just what was going on; none dared do anything about it.

## *Reversing the Spiral*

Now we are trying to reverse the trend of that spiral. It is a delicate and exacting operation, but somehow we must contrive to give it an upward impulse. And that means that purchasing power must be given a head start on prices and profits. With rare discretion the Administrator must manipulate the valves that control purchasing power and prices in order that the power under his control may flow into the former more rapidly than it does into the latter.

This requirement explains the anxiety of the Administration that, for the moment, prices and profits be kept subordinate to wages and employment. If we but have the faith and courage to manage this adjustment we may count on the cumulative effects of broader employment on public works and in private business, revived purchasing power, replenishment of inventories, rehabilitation of facilities and expansion of credit to strengthen the upward trend, to restore the normal processes of industry and thereby take care of prices and profits with due advantage to all.

It is understood that we cannot have prosperity without production and profits, but it is equally certain that we can have neither production nor profits without restored employment and purchasing power.

## *Primitive Methods Futile*

All this is plain to see. But to some of those who expound this doctrine most forcefully may we repeat once again that it is equally clear that we cannot achieve prosperity by reversion to primitive methods of production. It is absurd and futile to talk of expanding employment by restricting the use of machinery and other modern facilities. Such a course would be exactly opposed to the purpose of the Recovery Act. It would tend to raise costs and prices beyond the reach of available purchasing power. It might make more jobs in spots; it would not increase aggregate purchasing power. It would tear down the high purchasing power of those employed in the mechanical industries faster than it could build up the lower purchasing power of those employed elsewhere. It would ignore this elementary principle:

**The only means by which we are able to achieve higher standards of living for all is to increase the wealth-producing capacity of every worker.**

This high productivity made possible by the use of power and machinery is the very essence of our progress. If we abandon it, even temporarily, we do so to our injury. The ills from which we suffer are not caused by too great a production of wealth; that would be grotesque. They are the effects of our palpable failure to achieve a more equitable and beneficient distribution of the wealth we have learned how to create.

But that is another story. Suffice it here to recall that we should not seek to correct the evils of defective distribution and financial mismanagement by restricting our capacity to produce. If your baby were starving would you stop a waste or misuse of milk by shooting the cow?

Willard Chevalier

*Publishing Director*

Construction Methods. August, 1933. Volume 15, Number 8. Copyright, 1933, by McGraw-Hill Publishing Company, Inc.
Published monthly. Price 10 cents per copy. Subscription, $1 per year. Central and South American countries and Foreign, $2 U. S. currency or 10 shillings. Canada (including Canadian duty) $1.50. Entered as second-class matter, October, 1926, issue at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A. Cable Address "MCGRAWHILL, N. Y." Member A.B.P. Member A.B.C.

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

Editorial and Publishing Offices: 330 West 42d St., New York; 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Greenville, S. C. James H. McGraw, Chairman of the Board; Malcolm Muir, President; James H. McGraw, Jr., Vice-President and Treasurer; Mason Britton, Vice-President; Edgar Kobak, Vice-President; H. C. Parmelee, Vice-President; Harold W. McGraw, Vice-President; B. R. Putnam, Secretary.

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The illustration shows New York State Highway type Cement Weighing Batcher with electrical interlocks and motor-operated discharge gates.

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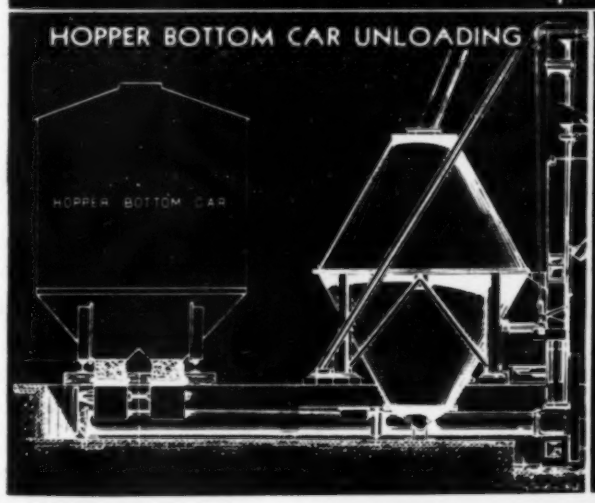


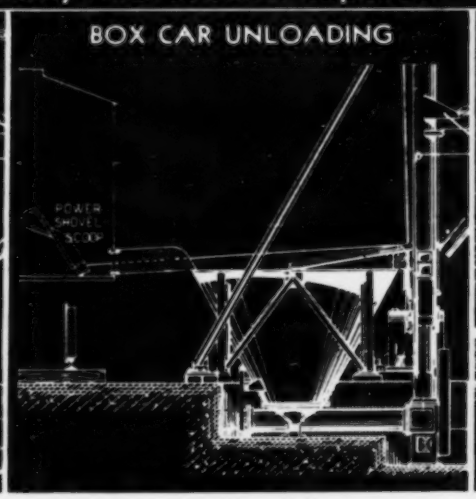


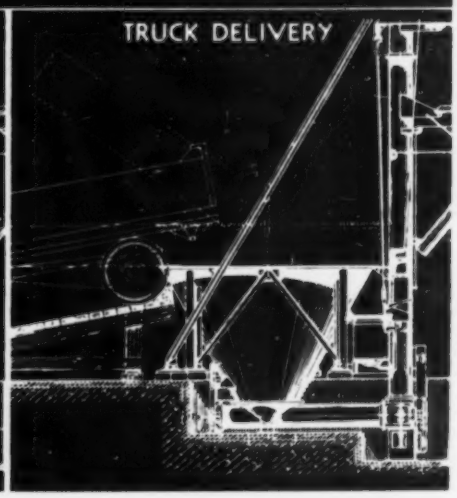


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THE fog signal station at Westport, Wash., near the entrance to Gray's Harbor, is close to the surf line and surrounded by broad stretches of shifting sand.

When storms sweep the Pacific heavy breakers pound the beach and crash against this exposed structure—harmlessly, however, because erosion and other damage to the foundation is prevented by a staunch protective wall of Bethlehem (Lackawanna) Steel Sheet Piling.

It was decided to build the wall in this way, following a study of various types of construction by the U. S. Lighthouse Service, chiefly because of the positive interlock, sure penetration, and long life that Bethlehem (Lackawanna) Piling offers. The advantage of sure penetration proved especially important, because many thick logs were encountered deep in the sand. The steel piling was driven successfully through all obstructions.

Despite its great strength and long life, this Bethlehem (Lackawanna) Piling wall—built of corrosion-resisting copper-bearing steel and painted—cost little more than a timber wall, and about one-third less than the other type of construction that was considered.

While Bethlehem (Lackawanna) Piling has been used in hundreds of projects of all types, involving the retaining of earth or water either in temporary or permanent construction, its advantages are perhaps most impressive in structures of this kind, intended to protect buildings or shore property from wave action. In no other way could this problem have been met so satisfactorily, so economically.

*Gray's Harbor Construction Company, Contractor*

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# And the U.S.A.
## will see that the money is wisely expended.

THAT means, among other things, that there'll be no place for excess costs in moving dirt on road jobs. If you're after these new jobs, you'll want to be in a position to handle dirt-moving at low cost. That's not difficult if you rely on P & H shovels. They're great respecters of pocketbooks and bids. They're speeded up for high production. They're super-powered to handle any kind of rough going. They're equipped with Split Second Control to see that you get the last dipperful of dirt out of every day's work. Designed and built for "New Deal" jobs, you are always ahead with a P & H.

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# The men BEHIND the man BEHIND the gun

ILLUSTRATING HOW PUBLIC CONSTRUCTION INCREASES EMPLOYMENT INSIDE AND OUTSIDE THE INDUSTRY

Courtesy of United States Pipe and Foundry Co.

In the late war four men were required in the rear to support every man at the front. Behind the men in the rear was the whole industrial structure of the United States, employing millions.

The engineering-construction industry provides comparable employment estimates. In normal times 3,000,000 people are employed directly in construction work. 83% of the construction dollar goes to these employees and to employees in other industries.

Different authorities agree in their estimates of the indirect benefits of a sustained program of construction: (1) that every billion dollars expended by the government for public works will provide employment directly and indirectly for one million men; (2) that for every man actually at work in the front lines of construction there are three to four behind him, making and transporting equipment and materials. This ratio has been established in highway construction. A single item, cast iron pipe, used extensively in water-works construction, provides employment in seven industries—coal mines, iron mines, limestone quarries, pipe foundries, blast furnaces, trucking and railway transportation. Water-works authorities estimate that it will require one million men a full month's time to produce and lay the cast iron pipe necessary to complete water-works improvements now on the project list.

* * * *

The engineering-construction industry, comprising 45,000 engineers and contractors, has been entrusted with the responsibility of accelerating this employment as Washington releases the $3,000,000,000 of finances. No one can foresee which engineers, which contractors will get the jobs. Nor is it economically feasible to contact all these engineers and contractors one by one with salesmen. There is a definite, effective way for manufacturers of equipment and materials to do the job—and that is with steady two-fisted advertising in

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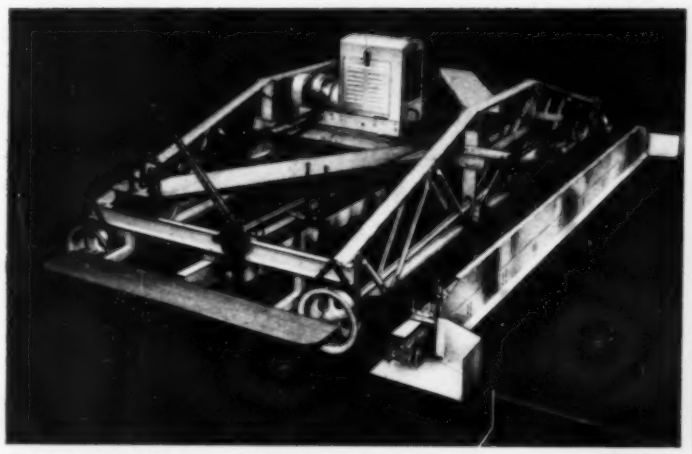

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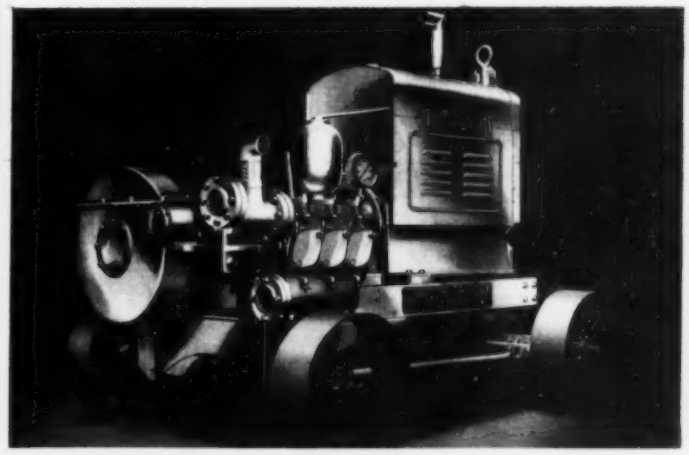

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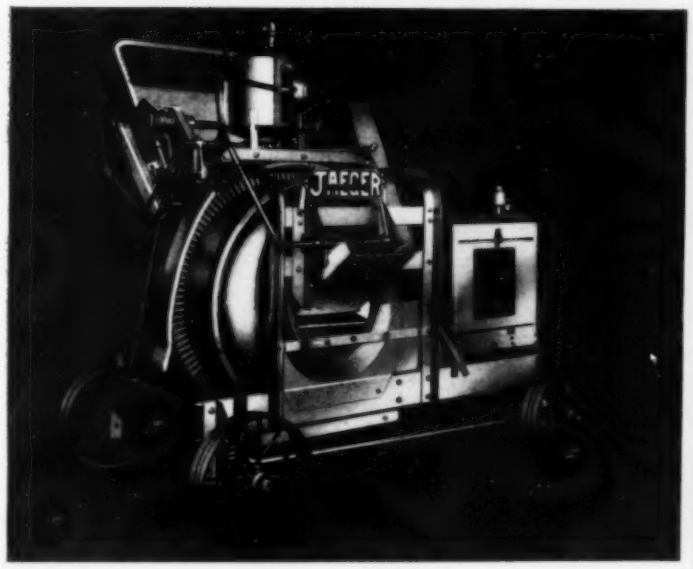


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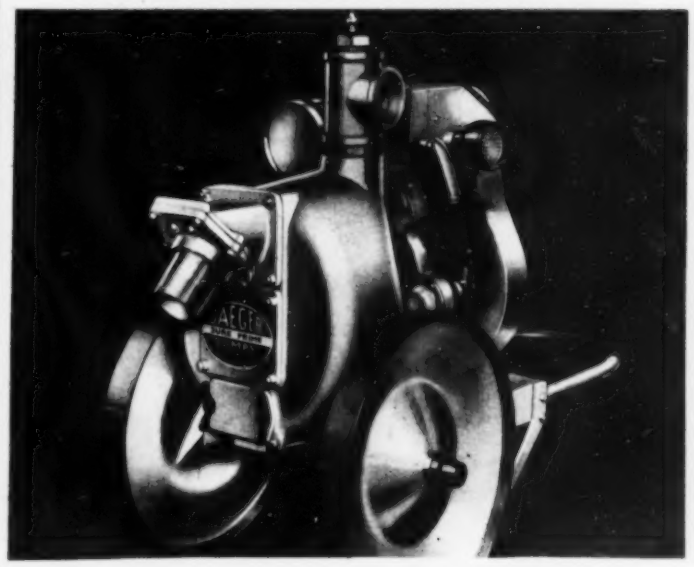

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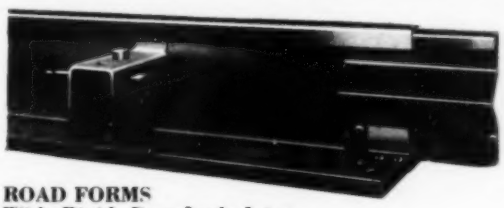

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North Sacramento Levee

## 25% More Yardage—Not Fuel Costs
### Made Profit on this Job

California levees or Mississippi levees—It makes no difference to A-C Tractors. These three Model "L's" pulling 11 yard scrapers built a levee near North Sacramento in record time at low cost per yard.

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# *The* Oldest Crudes *make the* Finest Lubricants *!*

*– Sinclair*

*[ Model of life-sized animated Stegosaurus in the Sinclair display at World's Fair, Chicago. It is used to emphasize the vast age of the crudes used by Sinclair. ]*

**Oils from the different geological ages vary greatly in lubricating quality. By and large, however, this one fact holds true: the older a crude is, *the finer lubricant it makes!* Sinclair stands almost alone among refiners today in its ability to furnish you with oils made from crudes taken from all three of the main producing areas—the Pennsylvania, Mid-continent and Gulf Coast fields. What is even more important, Sinclair can furnish you with the oldest oils (measured in millions of years) that these fields produce.**

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# At Pine Canyon Dam

## "Blind" Operation of G-E Equipped Cableway is Successful in Efficient Placing of Concrete

PROVIDING an important link in the concrete-handling system at Pine Canyon Dam, near Pasadena, California, is a G-E equipped twin cableway. Its operators are, of necessity, located in such a position as to prevent their seeing the buckets they control.

Because of this "blind" method of operation, instructions are telephoned to the hoist men from an observation tower overlooking the entire scene of activity. In spite of the apparent handicap, efficient placing of the 440,000 cu. yd. of concrete is being successfully accomplished through careful training of the personnel and through the accurate performance of the cableway, with its dependable G-E motors and control.

Wherever economical and successful construction work goes forward, it is significant that G-E motors and control are so often used. The reasons: General Electric offers the RIGHT MOTOR and the RIGHT CONTROL for every type of job; assists the contractor in correctly applying them to his problems; and assures him of prompt delivery and service when he is ready to use them. For complete information, address the nearest G-E office, or General Electric, Dept. 6-201, Schenectady, N. Y.

*General view of project at Pine Canyon from tail-tower end of Lidgerwood cableway, which is equipped with dependable G-E motors and control. Arrow indicates observation tower from which signals are telephoned to the "blind" operator shown in inset*

200-761

GENERAL ELECTRIC

# Where you need to turn...

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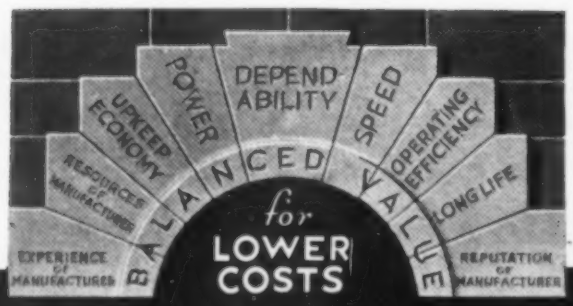


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# Construction Methods

ROBERT K. TOMLIN, Editor

Established 1919—McGraw-Hill Publishing Company, Inc. Volume 15—Number 8 —New York, August, 1933

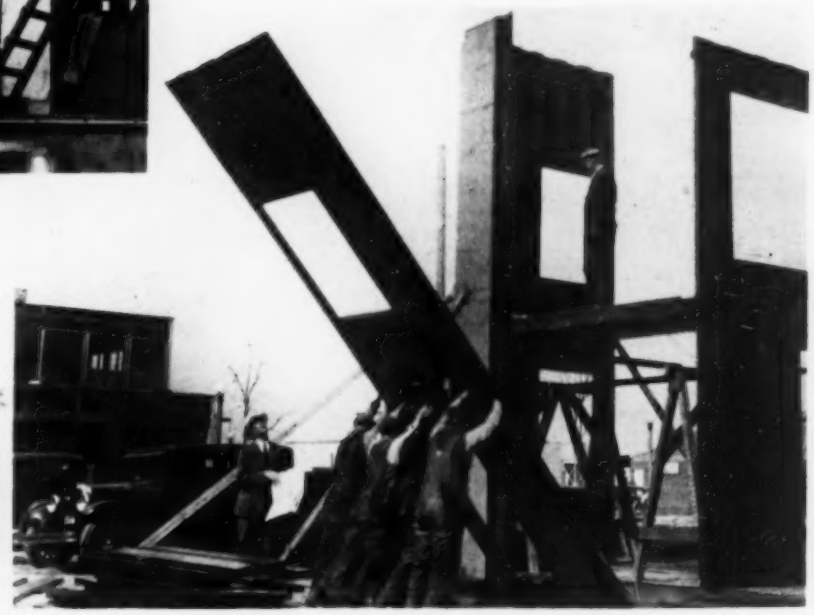

# *Frameless Steel House at World's Fair Has* ENAMELED EXTERIOR

A FRAMELESS house of prefabricated metal, devoid of studs, joists and rafters, with exterior wall covering of porcelain enameled metal panels, is demonstrating to Century of Progress visitors the latest developments in this type of residence construction. Containing seven large rooms and two baths, in addition to a garage and a roof solarium, the house is claimed by its sponsors, the American Rolling Mill Co., of Middletown, Ohio, and the Ferro-Enamel Co., of Cleveland, to fall within the $5,000 class for persons of moderate income. Although the Chicago house was designed to conform with the architectural style of the exposition, the frameless construction can be adapted to almost any type of architecture. The house was built by the Insulated Steel Construction Co., of Cleveland, in accordance with its patented frameless method, first employed in a demonstration residence at Solon, Ohio, as described in *Construction Methods,* Dec., 1932, pp. 30-33. Several modifications in procedure have been made since that time.

**PANELS** *(left)* **surfaced with porcelain enamel slip into grooved strips of rustless iron on insulated wall.**

Improved shop fabrication methods prepare the floor and wall sections. At the factory of the Insulated Steel Construction Co., long coils of sheet metal are shaped by recently invented rolling machines which produce channel sections for the walls and Z-plates for the floors. A conveyor transports the shapes to an automatic electric welding machine which assembles and welds the units into full-length floor sections and house-high wall sections for quick erection at the site. Metal door and window frames are welded into the various sections.

**WALL SECTION measuring 11 ft. wide and 19 ft. 6 in. high is raised into place.**



**TWO-STORY HEIGHT is provided for when prefabricated wall units are up-ended.**

**ENAMELED STEEL EXTERIOR** *(left)* **of seven-room house erected at Chicago Century of Progress Exposition.**

At the site, the floor sections are fastened to the foundation and to one another by sheet metal screws, forming a solid base for the walls. The erectors then place the wall sections in numbered sequence around the foundation and up-end them one at a time, fastening them together with sheet metal screws. A metal conduit welded to the wall sections at the ceiling line serves as a continuous bracket. The second floor and roof, which are of the same design as the first floor, then are erected on the house-high wall sections.

# *This Month's*

# "NEWS REEL"

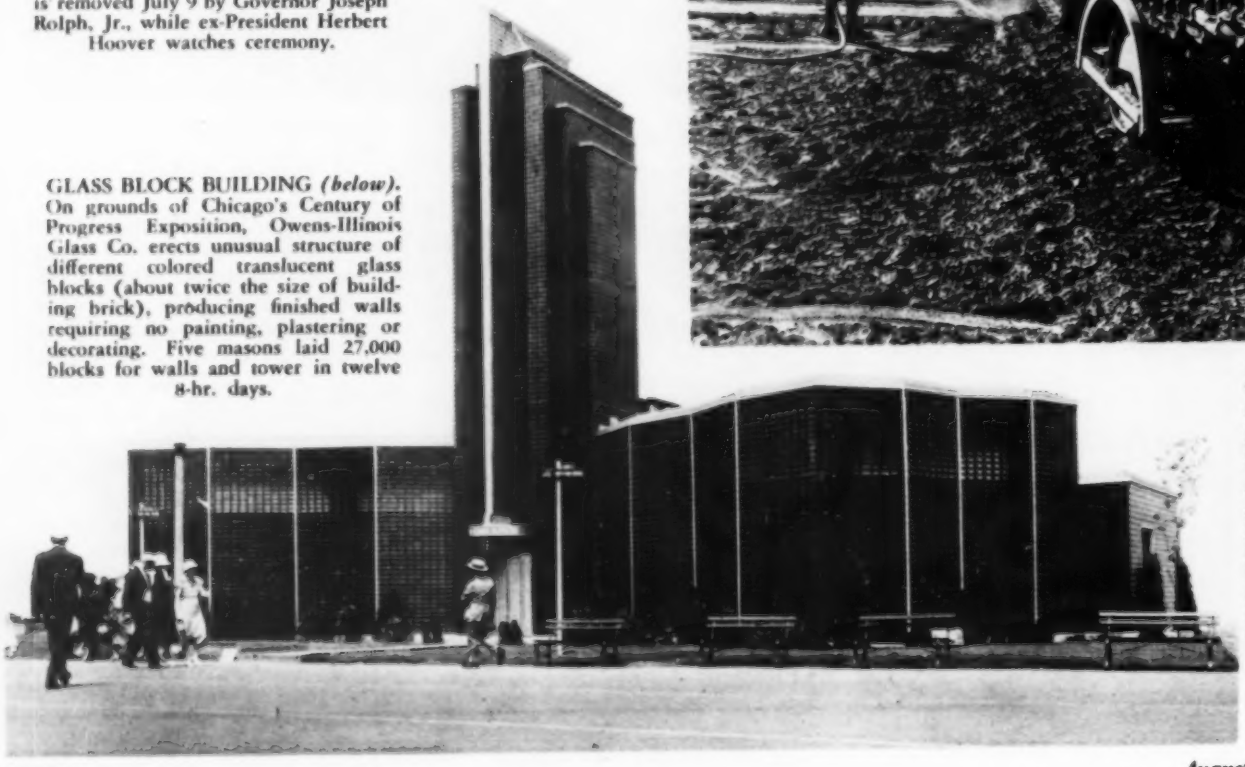
WINS BEAUTY PRIZE. Bryan Bridge over Niobrara River, Nebraska, built for State Department of Public Works under direction of J. G. Mason, bridge engineer, and Joseph Sorkin, designer, receives Class C award from American Institute of Steel Construction for most beautiful bridge costing less than $250,000 built during 1932. Structure fabricated by Paxton & Yierling Iron Works of Omaha.

Wide World Photo

FIRST SPADEFUL of earth from pier foundations of $78,000,000 San Francisco-Oakland Bay Bridge in California is removed July 9 by Governor Joseph Rolph, Jr., while ex-President Herbert Hoover watches ceremony.

SHEEPS-FOOT ROLLERS, hauled by Caterpillar diesel-powered tractors, consolidate earth fill for Bouquet Canyon dam, 185-ft. California structure being built by forces of Los Angeles Water Bureau, H. A. Van Norman, chief engineer, and H. L. Jacques, construction engineer. Dam, containing 2,800,000 cu.yd. of material, is 1,200 ft. long on crest and 400 ft. at streambed level. Upstream face is paved with 6- to 9-in. reinforced concrete slab. Earth fill, delivered by 8-yd. trucks, is spread by bulldozers into 9-in. layers and compacted.

GLASS BLOCK BUILDING *(below)*. On grounds of Chicago's Century of Progress Exposition, Owens-Illinois Glass Co. erects unusual structure of different colored translucent glass blocks (about twice the size of building brick), producing finished walls requiring no painting, plastering or decorating. Five masons laid 27,000 blocks for walls and tower in twelve 8-hr. days.

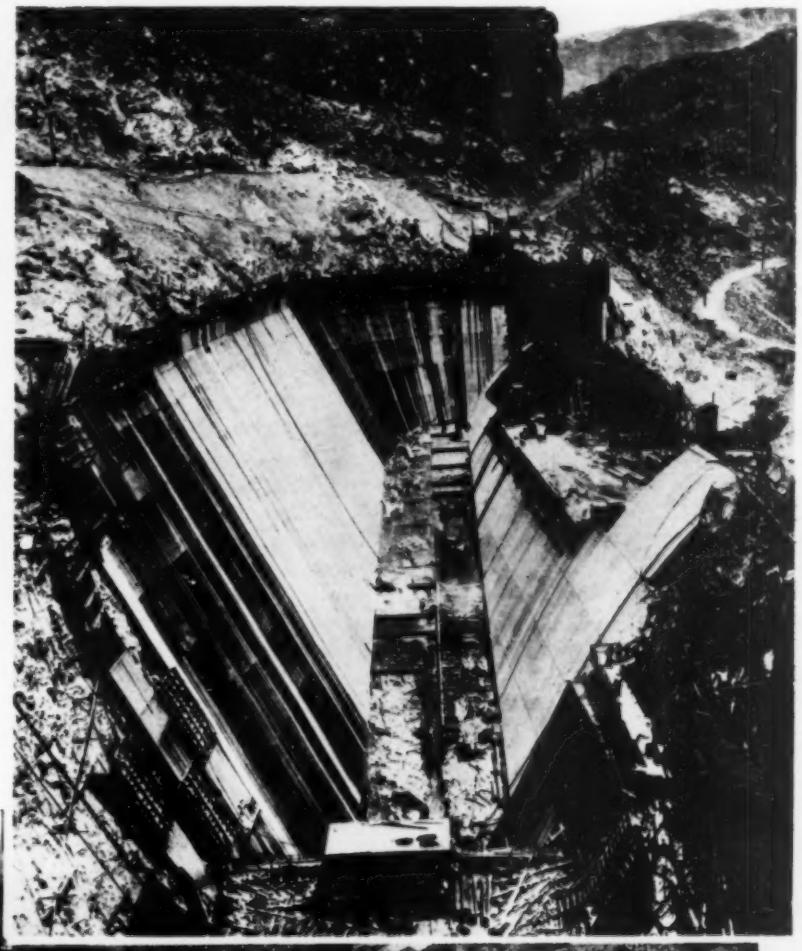


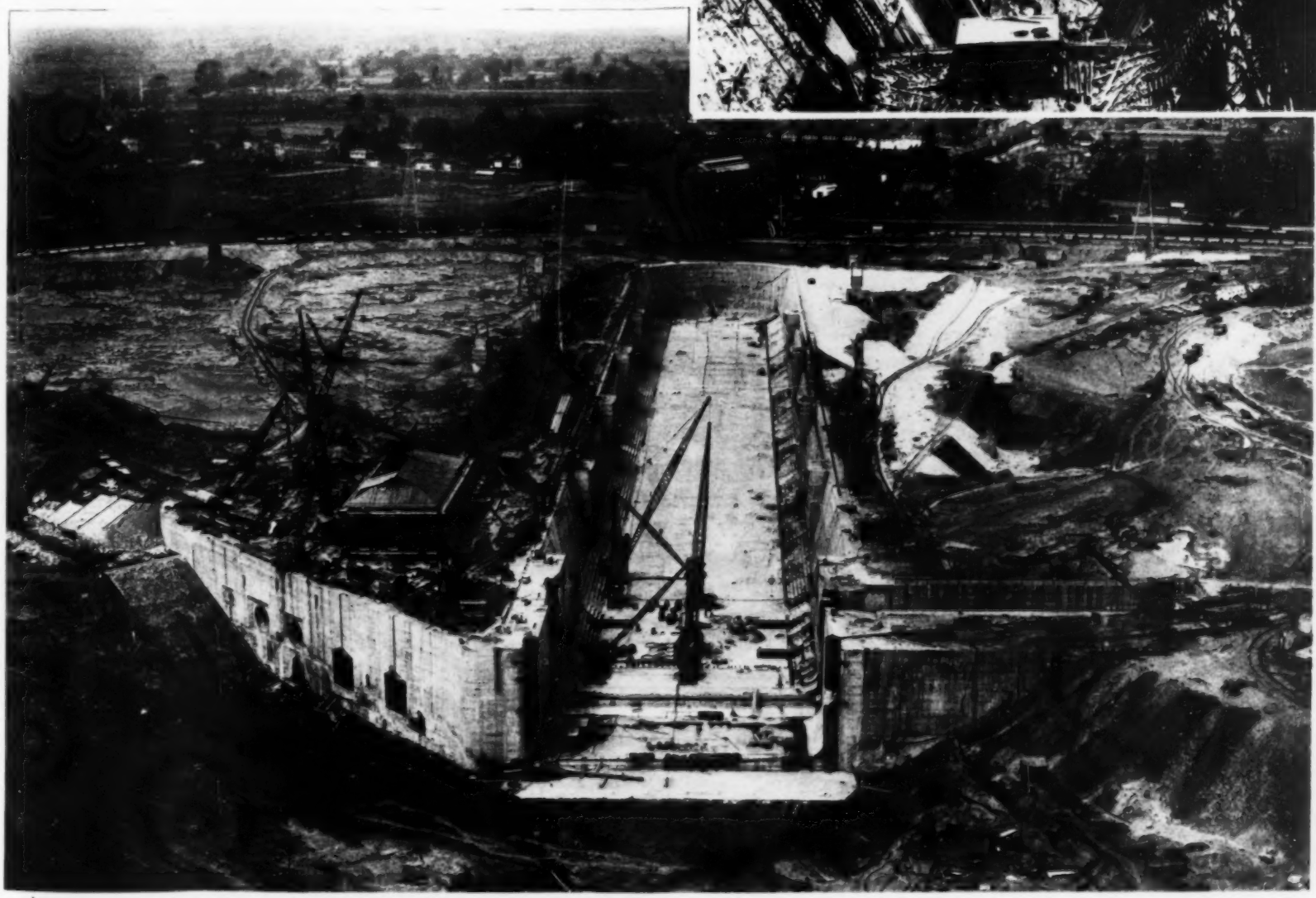
**DOTSERO CUTOFF** being built to provide direct transcontinental route to West through Denver via Moffat tunnel for Denver & Rio Grande Western Railroad. View shows 2½-yd. Link-Belt shovel grading portion of 40-mi. route between Dotsero and Orested, Colo., financed by $3,850,000 loan from Reconstruction Finance Corporation. Contractors, Utah-Bechtel-Morrison, Inc.

Globe Photo

**NEVADA SPILLWAY** *(below)* **for Boulder Dam is being lined with concrete by Six Companies Inc. Channel in rock, requiring excavation of 320,000 cu.yd. at top of Colorado River canyon, is 650 ft. long, 150 ft. wide and 120 ft. deep. It discharges into inclined tunnel connecting with 50-ft. diversion tunnel.**

Keystone Photo





**WORLD'S LARGEST DRYDOCK. Concrete structure 1,200 ft. long, 135 ft. wide and 59 ft. high from coping to floor, has been completed at Southampton, England, and was dedicated by King George last month. Floor is concrete slab 25 ft. thick at center and 17½ ft. thick at sides. Entrance is controlled by sliding steel caisson weighing 4,600 tons, held in place by granite-faced stops. Drydock was built on tidal mudland with aid of cofferdam formed by gravel bank and interlocking steel sheet piling.**

**The project involved 1,258,000 cu.yd. of excavation and 456,000 cu.yd. of concrete. Main items of plant used by contractors, Edmond Nuttall Sons and John Mowlem Co., included three 1¾-yd. steam draglines, 23 steam cranes, 10 electric 5- to 15-ton derrick cranes, 18 steam locomotives and 350 cars. Work was begun in 1931 and concluded under the direction of F. E. Wentworth-Shields, engineer. The drydock provides a 48½-ft. depth of water over the blocks.**

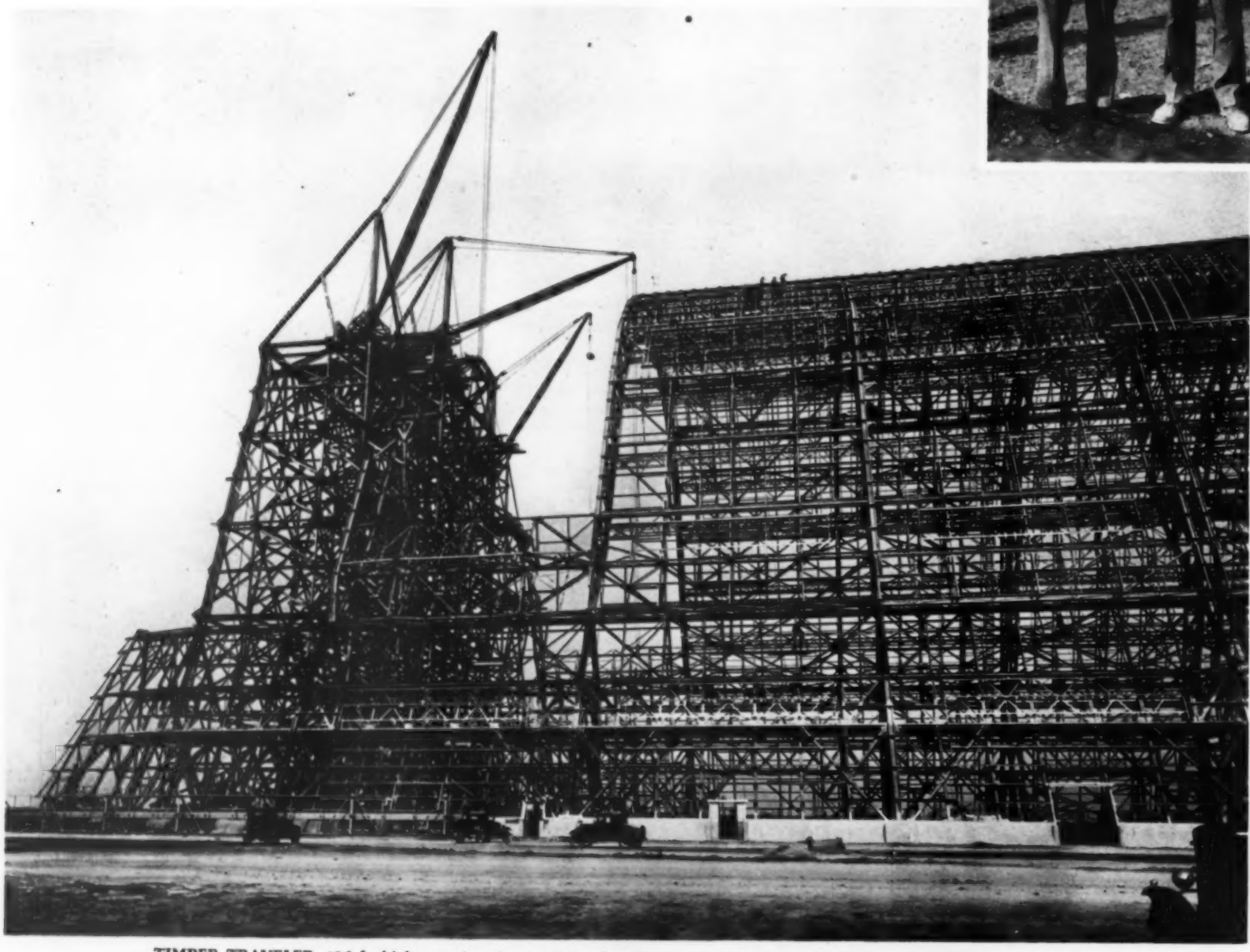
# *Steel for Giant Airdock Erected by*

# TALL TIMBER TRAVELER

TIMBER, and more timber, was used by J. H. Pomeroy & Co., Seattle, in solving problems of erecting the 8,500 tons of steel that make up the frame for the Sunnyvale airdock in California. A gigantic timber traveler, 196 ft. high, containing 350,000 ft. b.m., carried the three derricks that set steel at the rate of 350 tons, for a 72-ft. bay, in 3½ days. Even more astonishing was the mobility of the traveler which could be moved on its flat-car mounting to the next position in less than 2 min. The hangar is the major unit at the Pacific Coast naval air base about 35 mi. south of San Francisco. It will be the home of the airship, Macon, completed recently at Akron, Ohio. In addition, the station includes administration buildings, shops and barracks for a permanent force of about 500 men.

The timber traveler erection method was a distinct departure from the erection procedure used on previous airdocks and was given careful study and final approval by those in charge of the work. The plan was proposed by J. H. Pomeroy and was the basis for his erection bid, which was the lowest fig-

JACK POMEROY, *(below, left)*, who developed erection method, built traveler and supervised construction and V. G. HINDMARSH, his construction engineer.



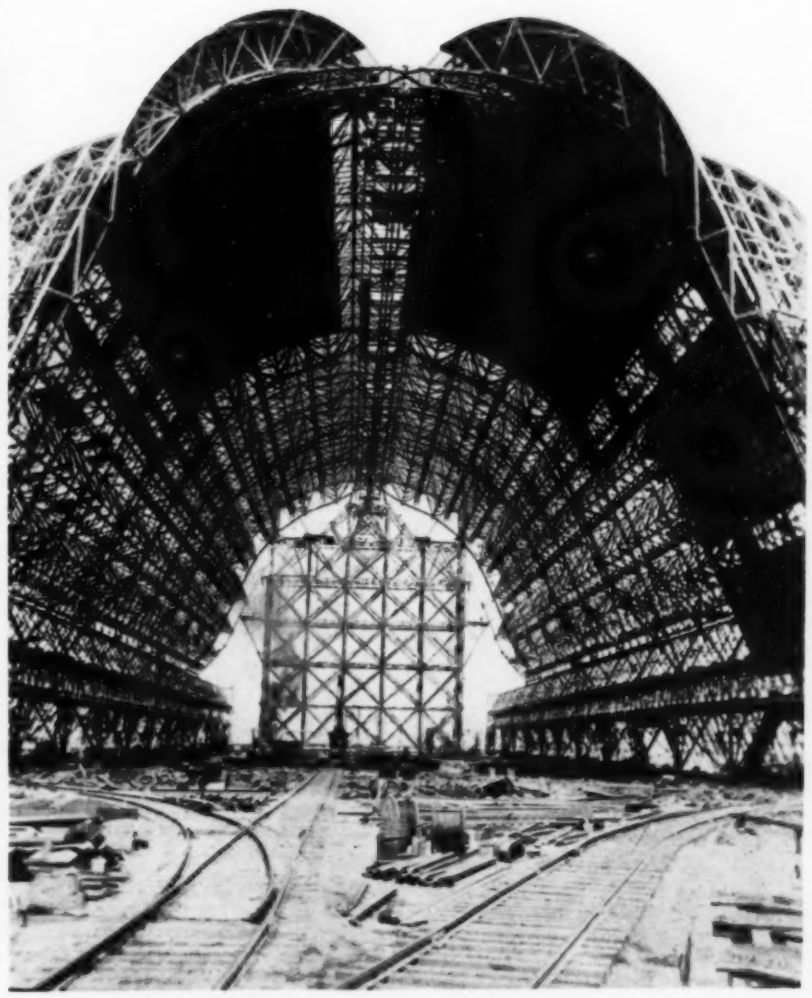
TIMBER TRAVELER, 196 ft. high, carrying three stiff-leg derricks, erects steel for frame of Sunnyvale airdock at rate of 350 tons in 3½ days. Mounted on railway flat cars, moved by three hoisting engines, traveler contains 350,000 ft. b. m. of lumber. Derricks command 72-ft. bay. Traveler weighs 300 tons.

**AIRDOCK FRAMEWORK, of equal-depth arch trusses on 72-ft. centers, is completed and siding is being placed. Structure is 1,117 ft. long, 308 ft. wide and 194 ft. high.**

ure submitted. He has had long experience in the field of steel erection in the Pacific Northwest and particularly with the use of high timber falsework. The most notable example was his 300-ft. tower used to erect the steel for the St. John's Bridge towers at Portland, Ore. (*Construction Methods,* Feb., 1932, pp. 20-23.) Confident that his proposed method would prove successful, the contractor submitted plans illustrating the procedure and after these were approved, built the traveler and carried out the program exactly in accordance with his proposal.

The dock at Sunnyvale is similar, in many respects, to the Akron structure. It is 1,117 ft. long, 308 ft. wide and 194 ft. high. The framework consists of a series of equal-depth arch trusses on 72-ft. centers with the necessary bracing and roof framing. The arch trusses are three-hinged and rest on rigid A-frames 55 ft. high. Although there is some difference in the design details between the two structures, many of the problems, from the standpoint of steel erection, were similar. The present description, therefore, offers a comparison with the erection methods used at the Akron dock, described in *Construction Methods,* July, 1929. The method at Akron consisted of using locomotive cranes with special extension booms, steel falsework and counterweighted cables.

*Traveler Construction*—The Sunnyvale traveler was primarily a series of simple timber bents with conventional framing of 10x12-in. posts, 12x12-in. caps and 4x12-in. cross-bracing. Requirements for the traveler included sufficient height, width and stability to permit the three derricks mounted on the top to place all of the steel in a 72-ft. bay and, at the same time, mobility so that erection would not be long delayed in moving the traveler.



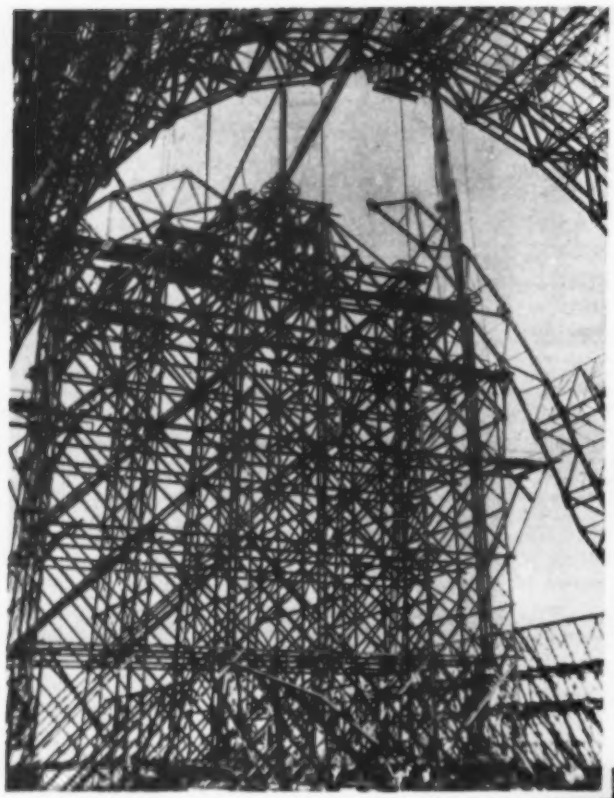
**LOOKING THROUGH partially completed steel framework, with tall timber erection traveler in background.**

The center derrick was 194 ft. above the ground and the two side derricks were placed on the next level 30 ft. below. The traveler was 150 ft. wide and had an 80-ft. depth along the line of the building. Framing panels were 32 ft. high, and the distance between bents was variable. The rear bent was placed on a batter of about 1 in 6.

One of the unique features of the traveler was the provision of a front bent, ahead of the one supporting the derricks, which was framed to provide support for the arch-truss section during erection. This bent had special extension caps, brace posts and jacks to carry the sections of arch and make the necessary adjustments prior to the driving of the top pin.

The supports under the derricks consisted of three 12x12-in. timbers. The framing would have placed these load concentrations at the center of the supporting flat-cars and resulted in the introduction of an A-frame at the lower end to distribute the load to the trucks of the cars. The traveler weighed about 500-tons, which was sufficient to eliminate the use of counterweights, although the ends of the derrick legs were fastened to cables which extended down the back side of the traveler to boxes of gravel weighing about 18 tons on the rear cars.

The traveler was supported on four pairs of 50-ton railroad flat-cars. These cars moved on tracks which were extended backward and recovered as the traveler was moved along the length of the structure. On the two outside

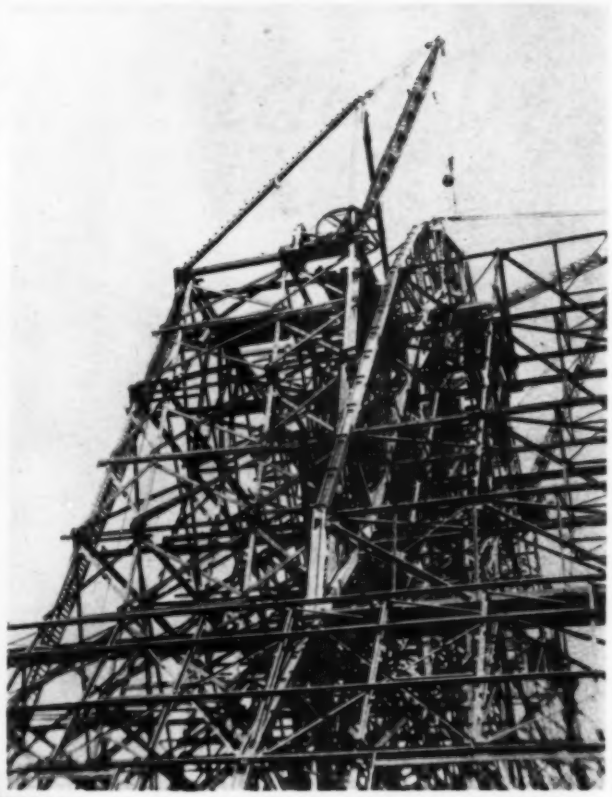


DERRICK on right side of timber traveler is placing 15-ton section of arch truss for airdock framework.

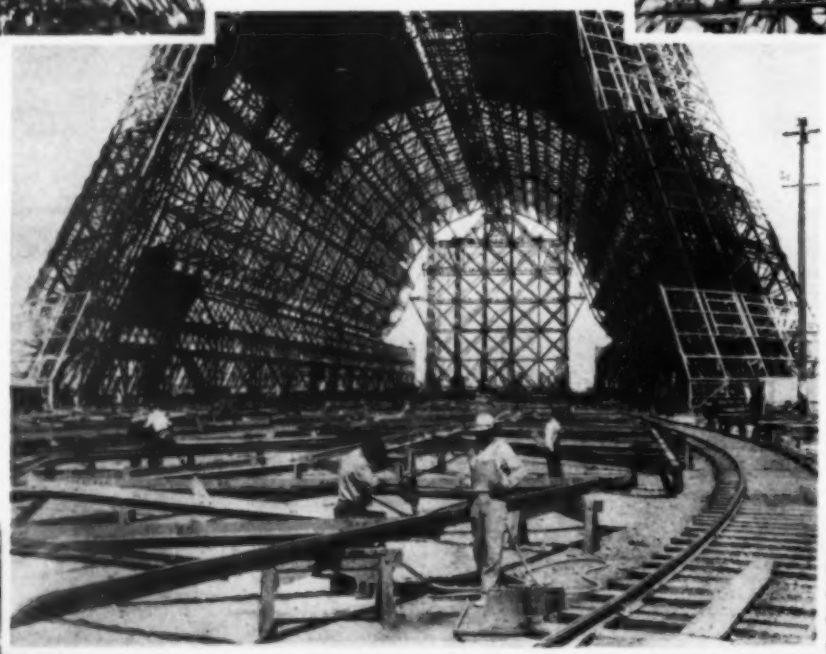
tracks and on one of the center tracks a trailer platform, supported on a single truck, was constructed at the rear of the supporting cars. On these trailers were mounted the hoisting engines and triple drums used to operate the derricks on the top of the traveler. Oil and water for these engines were piped from a common supply and the lines were extended as the traveler advanced. Each engine operated a 35-ton derrick. The outside derricks had 100-ft. latticed steel booms and timber legs; the center one an 85-ft. boom.

The traveler was built by the contractor and his crew without special engineering assistance in 18 days. In its original position all the steel for the first section and the two doors were erected. Following this first set-up, the traveler was moved to handle each successive bay. Erection procedure was constantly improved and went forward with increasing rapidity. During the latter part of the work a complete bay, consisting of arch truss, bracing, roof members and cat walks, totaling about 350 tons of steel, was fabricated and erected in 3½ days. In its final position the traveler erected the doors at the other end of the building.

*Fabrication* — Sections of bracing steel were fabricated in a yard outside the building and moved by railroad



LEADING BENT of traveler is framed to support sections of arch truss on blocking as they are erected and until top pin is driven.



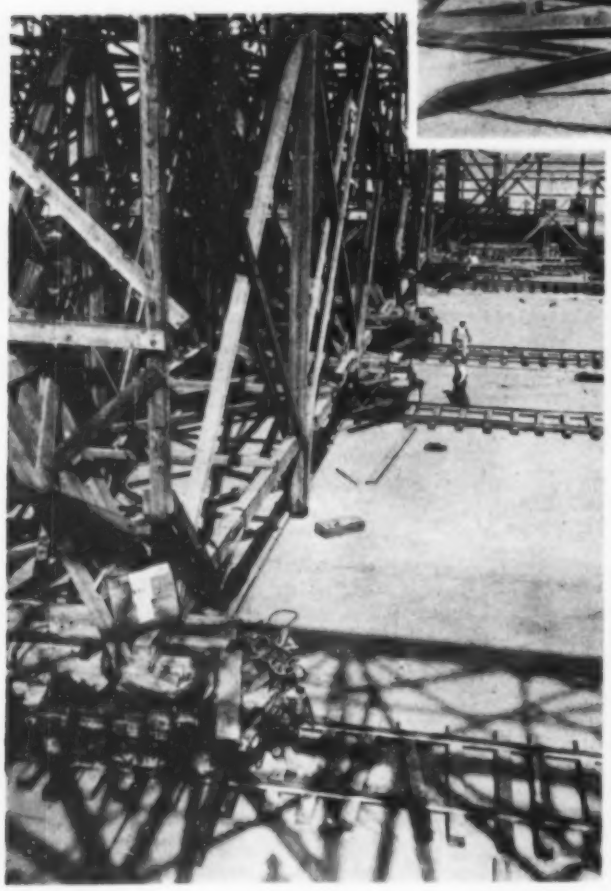
BRACING STEEL is fabricated into flat section outside airdock and delivered to traveler derricks by railroad car and crane.

crane in under the derricks of the traveler for further handling. This yard fabrication built the bracing into flat panels 72 ft. long. Although the original scheme was to fabricate the bracing complete in the yard, the rate of erection was so rapid that it became necessary to bring in the bracing in flat panels and complete fabrication of the triangular bracing trusses on the ground under the traveler derricks.

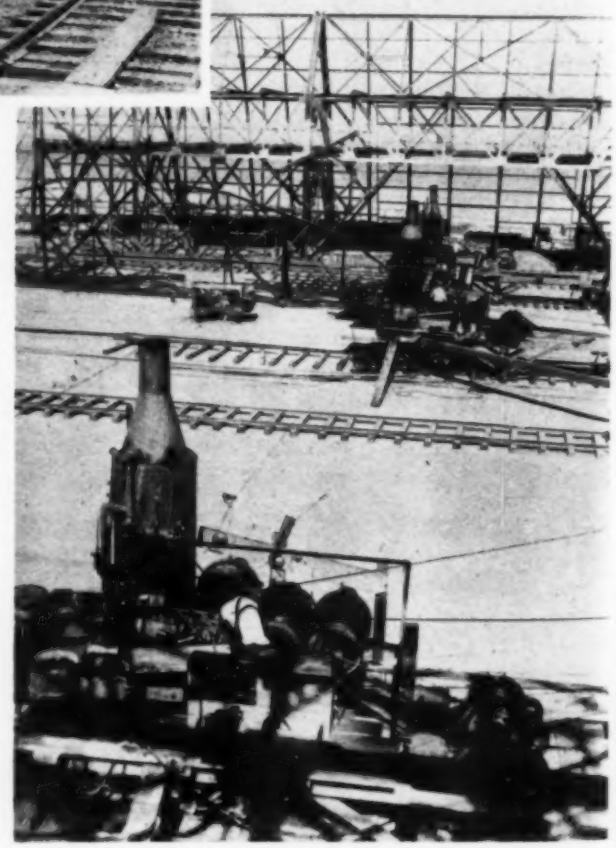
The A-frames which support the trusses rest on concrete pile foundations and were set up first by means of a locomotive crane assisted by crawler crane. The tops of these A-frames provide a pin connection with the lower end of the arch trusses.

*Erection Procedure*—The main section of the structure consists of twelve similar bays and erection procedure was gradually speeded and standardized to provide most efficient use for the traveler and its crew. Sections of the heavier arch steel and the flat panels of bracing were delivered to the derricks on the traveler by the locomotive crane operating on two side and a center construction track extending through the building. One of the der-

MOVING TO NEW SETUP *(below)* Front end of traveler, showing railroad tracks and flat car mounting.



THREE HOISTING MACHINES *(below)* on railroad track operate traveler derricks. Engines are oil-fired.

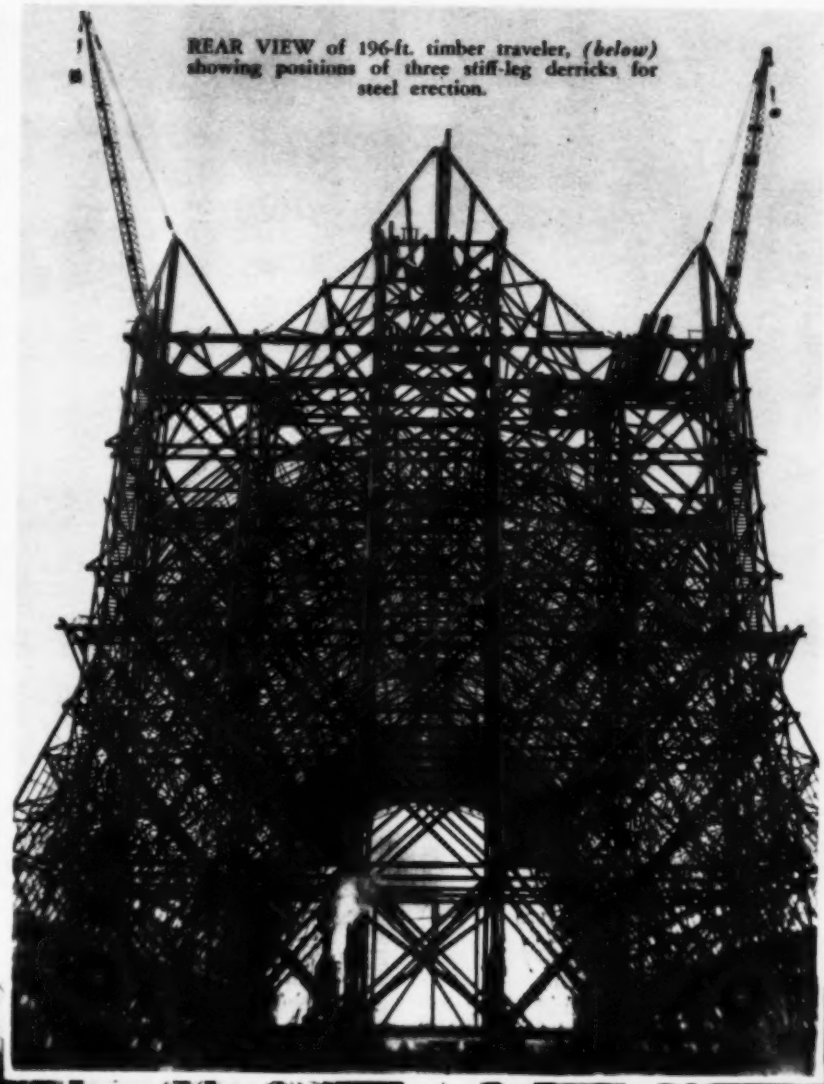


ricks was used to fabricate the bracing sections into fifteen triangular bracing trusses 72 ft. long, weighing about 10 tons each. While these sections of bracing were being fabricated, the other derricks were placing the sections of arch-truss which had been fabricated while the traveler was in a previous position. The arch truss was erected in six pieces, weighing between 15 and 20 tons each. After the arch-truss sections had been erected and the top pin driven, the supporting jacks on the first bent of the traveler were removed and the truss was in final position as a three-hinged arch.

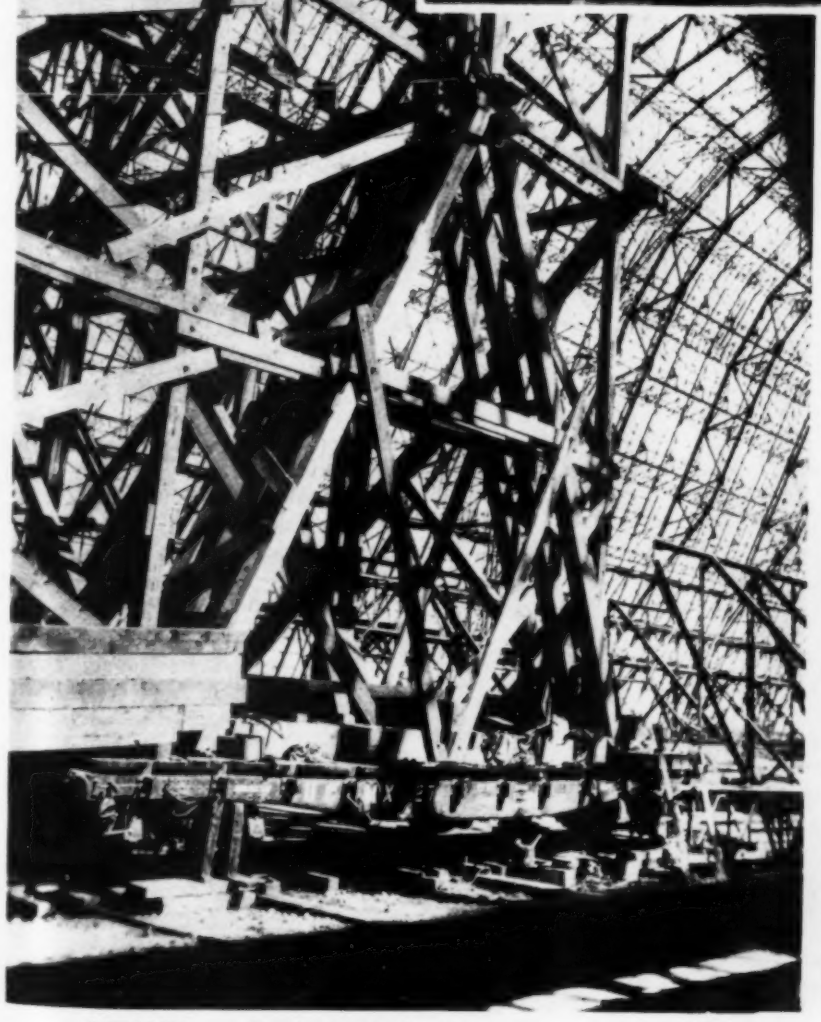
The work was particularly well organized so that the derricks on the traveler were in use practically all the time. Since there was no falsework required for each of the arches, there was no delay prior to the beginning of erection following the move of the traveler.

*Moving*—One of the most remarkable features of the erection method was the small amount of time required between the completion of work on one bay and the start on the next. With completion of work on one bay, the booms of the derricks were raised and lines were run through sheaves on the front end of the flat-cars to anchors in the rear. The side engines used a two-part line and the center engine, pulling the two pairs of cars, used a four-part line. The clamps which held the cars in position on the rails were moved back 72 ft. to the next position. The line from the center derrick was provided with a bridle so that the pull was equalized on the two center tracks. With these simple preparations made, a whistle was blown and the three hoisting engines were started simultaneously. The traveler started smoothly and moved without weaving. In less than 2 minutes the traveler had been moved back to the new position, the rail clamps were then set and the equipment was ready for beginning the next bay. The crew required to man the traveler, including the fabricating done on the ground, consisted of 32 men.

Construction operations at the Sunnyvale base were in charge of Lt. Comdr. E. L. Marshall, (CEC) U. S. Navy. Contract for the steel frame was held by the Wallace Bridge & Structural Steel Co., Seattle, E. L. Carpenter resident representative. J. H. Pomeroy & Co., Seattle and Portland, did the erecting. J. H. Pomeroy developed the erection method and personally supervised the work, assisted by V. G. Hindmarsh, construction engineer, and J. R. McDonald, erection superintendent.



**REAR VIEW of 196-ft. timber traveler, *(below)* showing positions of three stiff-leg derricks for steel erection.**



**A-FRAMES transfer derrick loads of traveler to railway flat-car supports.**

**BLOCKING of car wheels to hold traveler in place. Weight of traveler was sufficient to eliminate need of counterweights.**

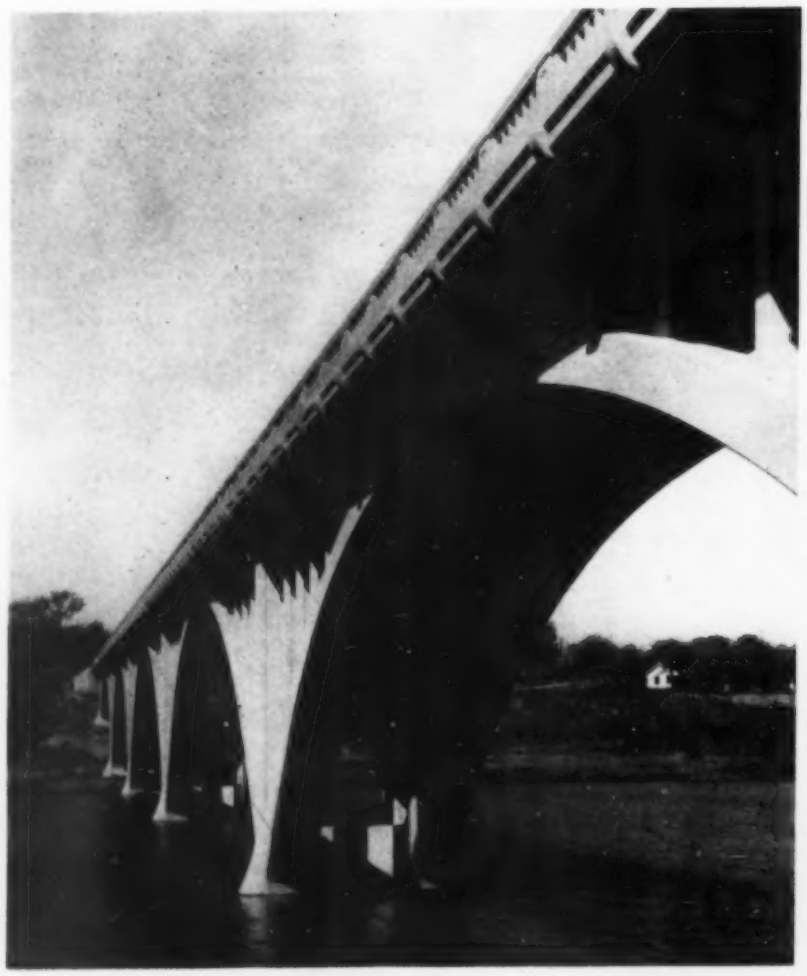
# *Multiple Arch Concrete Bridge Built on* TIMBER FALSEWORK

By F. C. HART,
*Construction Engineer,*
*Fred Luttjohann, Contractor,*
*Topeka, Kan.*

IN building a multiple-arch concrete highway bridge across the White River between Branson and Hollister, Mo., Fred Luttjohann, contractor, of Topeka, Kan., made effective use of an inexpensive job-assembled traveler, equipped with boom and steam hoist, for driving timber falsework piling and steel sheetpiling for cofferdams at pier footings, erecting and removing arch centering and falsework and handling concrete for the footings and piers. The traveler, operating on a pile-supported trestle across the river, was chosen in preference to floating plant because the water at the bridge site is too shallow, in places, to accommodate a barge-mounted rig, which, while possibly faster in operation, would have been more costly. The gamble of losing the construction trestle and traveler outfit, in the event of a 12-ft. rise of the river, was taken by the contractor and won. The river gods were lenient, and the outfit finished its job without damage by floods.

Designed by the engineers of the Missouri Highway Commission, under T. H. Cutler, state highway engineer, the White River Bridge has a total length of 1,087 ft., consisting of two 56-ft. deck girder approach spans, one at each end of the structure, and five 195-ft. two-rib, open-spandrel concrete arches supporting a 20-ft. roadway, with 5-ft. sidewalks on each side, about 50 ft. above the river surface. The pilasters, railings and brackets of the new bridge, completed last year, are of ornamental design, as illustrated.

To carry the traveler, falsework piling was first driven by a drop hammer and capped to support a runway along which the rig moved forward across the river. Pier foundations for the arch spans were constructed by driving steel sheetpiling cofferdams and excavating the material within them by a clamshell bucket rigged on the traveler boom. The falsework piling later served as a support for the erection of the arch centering.



FIVE ARCHES, of two-rib, open-spandrel design, have spans of 195 ft. each across White River.

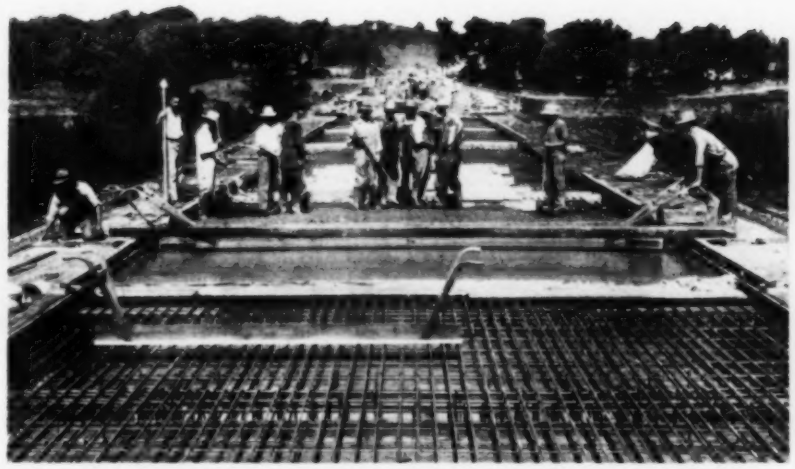
The major cost item in the bridge contract was for labor and material involved in the erection of the arch centering. For that reason the subject was given considerable study. The first two arches on the Branson side are unsymmetrical, while the next three are symmetrical. For these last three the springing line is level, but the entire bridge is on a 1.72 per cent grade, the Branson end being the highest. No two arches, therefore, have the same rise. On account of the form of arches, and the cost of various types of steel centering that could be used, we decided in favor of wood bent centering. We estimated that we could afford to lose at least one complete arch and centering and yet save money by so doing. As no high water occurred, the choice was very much to our advantage.

Beneath the three river spans two 48x18-ft. waterways were provided for each span. Two 110-lb., 30-in. I-beams, each 52 ft. long under each arch rib, supported the falsework over the 48-ft. clear span, as shown in one of the accompanying illustrations. Towers 18 ft. high above the springing line were placed at the center of each span and at the ends of the I-beams. These towers were set on nests of twenty piles

each. The piling was cross-braced under the water. All piling for towers and falsework was driven to rock, which was from 20 ft. to 26 ft. below the water line. The average low water level was a little below the springing line. Enough timber for stringers, caps, bracing, etc., for two spans was delivered on the job. That used on span 2-3 was cut down for span 4-5 and again cut down for span 6-7. That used on span 3-4 was cut down to fit span 5-6. The same rotation was followed in use of arch-ring forms, deck forms and bracing.

Falsework bents were placed so as to balance the load each would carry. The greatest span length was in the center of the arch ring, and the length of span decreased each way to the skewbacks. The greatest height from water line to intrados was 53 ft. The tallest bents used were 20 ft. high. All the piling caps for a span were made level except on spans 2-3 and 3-4, where the ground was uneven. We did not attempt to make the cutoff for caps the same elevation for the second and third tier of bents, but each bent was made level from end to end. The bents were assembled on the ground or on a scaffold over the water and set in place by a crane or winches. On the river, two hand winches were used to advantage.

Each bent consisted of five 8x8-in. columns, two under each ring and one in the center. The bents were 24 ft. long. Two 2x10-in. timbers, each 14 ft. long, were used to cap each bent, the splice being over the center column. Each bent was braced rigidly from side to side. Every other pair of bents was tied together lengthwise by cross-bracing and alternated for each tier. Two level lines of 3x8-in. stiffeners were fastened to each of the four main columns and run the length of the span. One line was placed near the bottom of the second tier and the other just below the top cap on each bent. The piling cap and columns were doweled with a ½-in. round reinforcing bar. Near the skewbacks, where the thrust was toward the center of the arch instead of vertical, heavy struts were placed as nearly on the line of thrust as practicable. The struts were carried to the nearest piling cap. Longitudinal stiffeners were placed from cap to cap to distribute the thrust. Native pine and oak poles were used for this purpose.



**REINFORCED DECK carries 20-ft. roadway flanked on each side by 5-ft. sidewalks.**

On top of the upper cap of the falsework bent five 4x16-in. stringers were placed longitudinally under each arch ring. The outside stringers were bolted together at the ends to prevent slipping during settlement. The others were held in place by bridging and by cleats at the lower end, where they overlapped the one below. This method to prevent slipping did not interfere with the necessary shortening of the line of stringers when settlement occurred under the combined weight of forms, reinforcing steel and fresh concrete. An arc cut from 3x8-in. timber was tacked to each stringer. Each arc was cut to fit the curve of the section of intrados involved. Sleepers of 2x6-in. timber were tacked across the arcs and 1¼-in. lagging nailed on longitudinally and bent to fit the curve of the arch.

Wedges were placed between the 4x16-in. timbers and the bent caps. Each set of ten wedges was cut to fit the angle between the stringer and the horizontal top of the cap. Thus two sets of ten wedges each were necessary at each cap. Camber for settlement was added at the time of erection. To the height of each bent was added camber for settlement of the arch after removal of centering plus the anticipated settlement of the centering under the combined load of forms, reinforcing steel and concrete. This total height of each bent was given to the crew doing the erecting.

After setting the stringers, the wedges were set and a templet used to bring the stringers to the proper elevation. The wedges were then fastened in place and it was seldom found necessary to change them during placing of the concrete. The first step in removing the centering was to drive out these oak wedges and remove cleats and bolts from the stringers. The stringers then being loose, the 2x6-in. sleepers could be taken out and the lagging freed.

For Fred Luttjohann, contractor, of Topeka, Kan., W. A. Sailer was superintendent and Nate Hopkins, general foreman.

**FALSEWORK, supported by piles, carries wooden centering for 195-ft. arch span. Note 52-ft. I-beams spanning waterway openings in trestle and carrying upper tier of falsework for arch forms.**

# *Delaware Highway*

# 1-Yd. Bucket

AGITATOR TRUCK on timber ramp discharges portion of 4-yd. load of concrete into 1-yd. bottom-dump bucket on dipper stick of power shovel.

SPECIAL conditions surrounding a three-lane concrete paving project 2 mi. in length, which Vincent Schiavi, contractor, of Buffalo, N. Y., built recently for the Delaware State Highway Department, induced the contractor to utilize ready-mixed concrete delivered from a commercial plant in agitator trucks and to place the material on the subgrade with a bottom-dump bucket hung from the dipper-stick of a power shovel. This unusual concreting plant was adapted to take advantage of practically all factors influencing the conduct of the work and was capable of delivering a higher production than could have been obtained with a 1-yd. paving mixer under Delaware specifications.

*Dual Highway Project*—The Schiavi contract called for the construction of a three-lane concrete pavement parallel with and at a distance of 70 ft. from an existing four-lane concrete pavement of the DuPont Highway. This project was part of a 7-mi. program designed to fill gaps on one side of the present dual highway and to provide 31 mi. of continuous dual-type road extending south from Wilmington toward Dover.

In accordance with Delaware standards, the three-lane pavement was constructed 31 ft. wide, with an 11-ft. center lane and two 10-ft. side strips. The pavement has a uniform thickness of 8 in. and doweled ¾-in. expansion joints 70 ft. apart. No reinforcement is used in the slab. Grading of the project was completed a year ago under separate contract by the same contractor. The alignment of the highway on this section is straight and the grades are negligible.

*Choice of Plant*—Proximity of the project to the city of Wilmington, which lies just 2 mi. from the north end of the contract, placed the job within economical hauling distance from a commercial mixing plant and suggested the use of ready-mixed concrete. The location of the proposed pavement, parallel with an existing four-lane highway from which it is separated by a 70-ft. grass strip, provided an almost ideal situation for hauling and delivering concrete. Purchase of ready-mixed concrete was further encouraged by a state specification which calls for a 1½-min. mixing period. This requirement limits the production of a paving mixer to about 35 batches an hour. Vincent Schiavi planned: (1) to obtain a higher rate of production by buying ready-mixed concrete, and (2) to equip the job economically with units of a complete grading and concrete paving plant which he had in storage about 20 mi. from the project.

Delaware specifications forbid direct dumping or chuting of concrete from trucks to subgrade. As the yardage involved in the contract did not justify

# *Concrete Placed by*

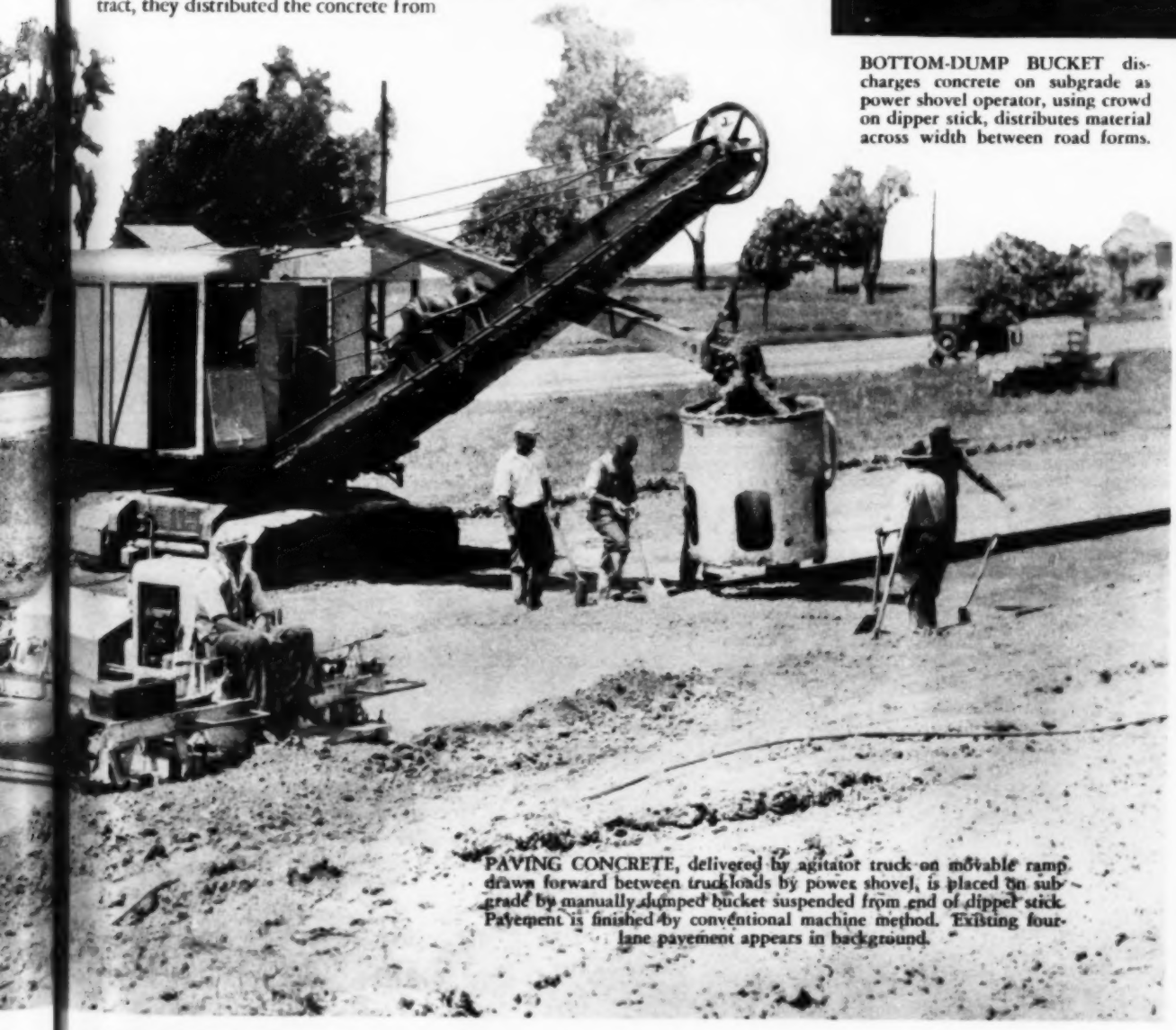
# on Power Shovel

the purchase of a mechanical spreader, the contractor devised an unusual boom-and-bucket arrangement employing a Lima full-revolving crawler-mounted power shovel which was included among the equipment available for the job. The new method was an improvement over previous experiments with similar equipment in this part of Delaware.

Ready-mixed concrete had been employed on two previous contracts in the vicinity of Wilmington by George & Lynch, of Dover, Del. These contractors had complied with the state highway specifications in one case by running the ready-mixed concrete through a paving mixer. On their second contract, they distributed the concrete from the agitator trucks with a power shovel, using the standard dipper to carry and dump the concrete. The standard shovel dipper, however, was not entirely satisfactory for this purpose. On the present dual highway contract, Vincent Schiavi substituted a Blaw-Knox 1-yd. bottom-dump concrete bucket to eliminate the dropping of concrete and lack of dumping control experienced with the ordinary shovel dipper.

Height of the concrete bucket made it necessary to raise the rear end of the agitator trucks a couple of feet to dump into the bucket. This need was supplied by a timber ramp which the power shovel dragged behind it. As indicated by one of the photographs, the agitator trucks backed up the ramp to dump into the concrete bucket. This arrangement had one slightly undesirable effect in that it required all trucks to dump behind the shovel and removed the possibility of having them discharge their loads in front of the machine.

BOTTOM-DUMP BUCKET discharges concrete on subgrade as power shovel operator, using crowd on dipper stick, distributes material across width between road forms.

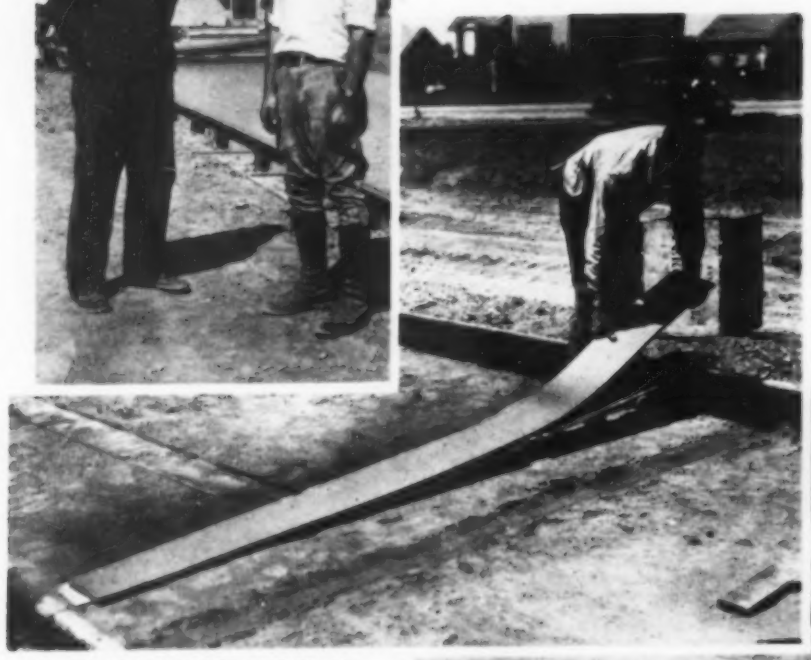


PAVING CONCRETE, delivered by agitator truck on movable ramp drawn forward between truckloads by power shovel, is placed on subgrade by manually dumped bucket suspended from end of dipper stick. Pavement is finished by conventional machine method. Existing four-lane pavement appears in background.

*Paving Procedure*—Specifications required that the three lanes be concreted independently. Paving operations for each lane were carried on from the south end to the north, with a maximum concrete haul to the south end of 4 mi. Six to eight trucks equipped with Blaw-Knox agitator bodies transported 4-yd. loads of ready-mixed concrete from the Warner Co.'s plant in Wilmington. At the job, the power shovel and attached ramp operated along the level grade or grass strip at the proper distance from the forms to enable the shovel runner to distribute the concrete on the subgrade. Each truck backed up the timber ramp and discharged four times into the 1-yd. bottom-dump bucket. After the truck left the ramp, the shovel and ramp moved ahead about 16 ft. The shovel often made this move with a full bucket of concrete on the dipper stick.

An Ord finishing machine, adjustable for use on both 10- and 11-ft. lanes, followed closely behind the concrete-placing crew. When the finishing machine was not in the way, the shovel made a one-quarter turn from the agitator truck to the point of dump-

S. MORRIS *(left)*, inspector for State Highway Department, and ALFRED SCHIAVI, contractor's superintendent.



CORK EXPANSION JOINT, ¾-in. thick, is installed with temporary metal plates. COMPLETED JOINT INSTALLATION *(right)*, with dowel bars in place. Temporary metal plate is being coated with oil.

ing the concrete. If the finishing machine ran too close to the concrete-placing operation, however, the shovel had to rotate through a three-quarter turn in the opposite direction. One man on the subgrade opened the discharge gate of the bucket by pulling down on the pipe handle. By using the crowd on the dipper stick, the shovel runner, who formerly operated a paving mixer, distributed the concrete fairly uniformly across the width of the subgrade between the forms. This uniform distribution lightened the work of the two shovelers who leveled the concrete for the finishing machine. A few small drippings fell from the truck discharge spout on to a steel plate from which they were easily removed with a hand shovel and placed within the forms.

*Progress*—As a check on the speed with which the power shovel could place concrete, the time required to unload two trucks was noted by a representative of *Construction Methods* who visited the work. The shovel unloaded two trucks, placed 8 yd. of concrete, and made two moves with the ramp in 7 min. 40 sec. When this time was taken, no delay was experienced in waiting for a second truck.

ALUMINUM BROOM with ends of metal ribs turned down forms corrugations in surface of finished slab prior to covering with burlap.

Average progress on the first lane (9,450 lin. ft. of 8-in. slab 10 ft. wide) was 35.2 cu.yd. an hour. On the second lane (9,450 ft. long and 11 ft. wide) the contractor averaged 44.0 cu. yd. an hour. The third and longest lane (9,680 lin. ft. of 10-ft. width) was completed at an average rate of 43.2 cu.yd. an hour. Production for the entire job averaged 39.7 cu.yd. an hour. These records allow for an average concrete overrun of 1 per cent.

On the longest day's run, June 14, when 1,983 lin. ft. of 10-ft. lane was completed in 9¾ hr., concreting progressed at an average hourly rate of 50.7 cu.yd. The work was started May 2 and was completed June 14. Concrete was placed on 24 days. Sundays and rain or wet subgrade accounted for 16 days during the working period.

TRACTOR - POWERED BLADE GRADER smooths grade in advance of form setting.

SUBGRADE PLANER *(below)* riding on forms is drawn forward by 3-ton tractor roller.

ALFRED SCHIAVI *(left)*, superintendent; VINCENT SCHIAVI, contractor; E. E. DOWNING, resident engineer; and H. E. YATES, general superintendent.

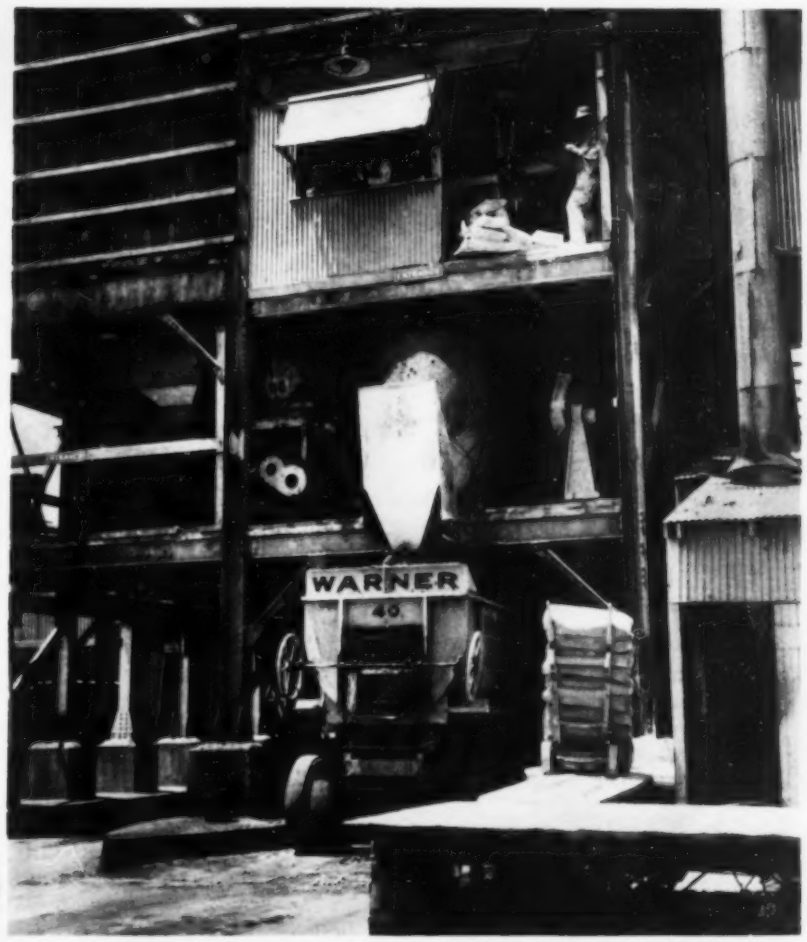
*Concrete Mixing Plant*—Concrete was mixed in a 2-yd. electric-motor-driven Smith tilting mixer at the commercial plant. Each batch was mixed 1½ min., limiting the potential output of the plant to somewhat less than 60 yd. an hour. The trucks carried two batches per trip.

*Finishing*—In addition to the usual finishing operations with straight-edges and long-handled floats behind the finishing machine, the surface of the concrete was raked with a fan-shaped aluminum broom. The ends of the metal ribs of this broom were bent down to form corrugations ⅜ to ½ in. deep in the mortar surface of the concrete slab. Delaware has followed this practice of roughening the surface to provide better traction for 5 years with satisfactory results and with no resultant scaling of the concrete.

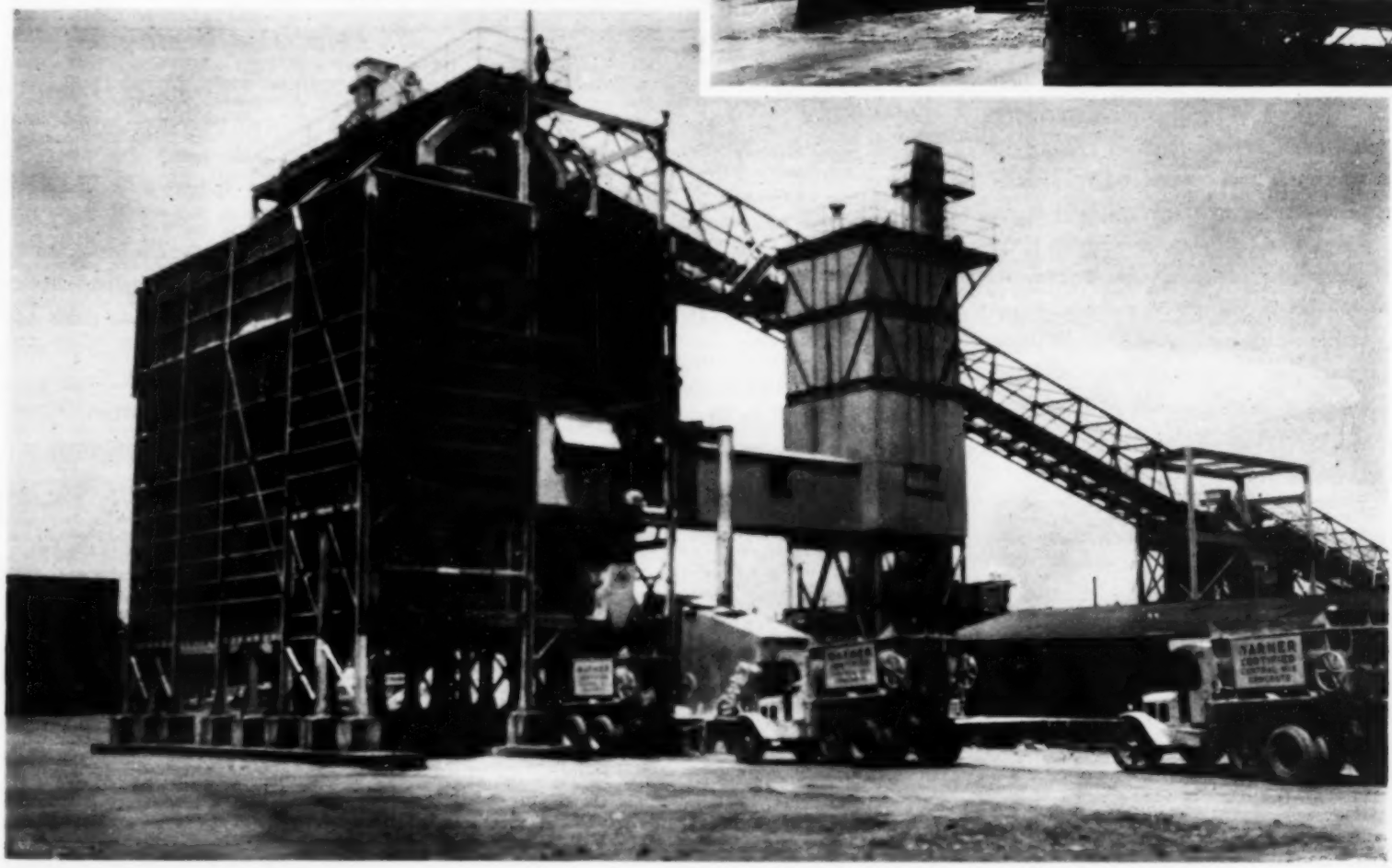
After curing for 24 hr. with wet burlap, the concrete was covered with earth. Earth curing was substituted in the state this year for calcium chloride with the intention of providing more employment. Water was supplied by a Jaeger pump through 2 mi. of 2½-in. pipe line. A smaller line would have been adequate for the needs of this contract, but the contractor, of course, used equipment on hand.

Delaware continued on this project the practice initiated last year of using cork expansion joints. One of the photographs shows the installation of a Johns-Manville cork joint. Although the material is more expensive than premolded asphalt, the highway department feels that it has advantages in greater resiliency, probably longer life and freedom from surface bumps. The project was equipped with 4,000 lin. ft. of Blaw-Knox road forms, ample to take care of daily progress after the first lane had been completed.

*Supervision*—Construction of the dual highway is being carried out under the general direction of W. W. Mack, chief engineer of the state highway department, with E. E. Downing, resident engineer, Wilmington, in direct charge. H. E. Yates, general superintendent, supervised the work on this project for the contractor. Alfred Schiavi, superintendent, was in charge of operations.




2-YD. TILTING MIXER discharges into agitator truck at commercial plant. Trucks haul two 2-yd. batches per trip. COMMERCIAL MIXING PLANT *(below)* supplies ready-mixed concrete to project with fleet of agitator trucks.



# CONSTRUCTION CODE

## Rules of Fair Competition, Adopted by Construction Engineering, Architecture, General Contracting,

AN ALL-INCLUSIVE MASTER CODE for the construction industry, embracing the major operating elements of engineering, architecture, general contracting, subcontracting, and equipment and material supply, was adopted Aug. 1 and submitted to the National Recovery Administration with a request that it be accepted as superseding the President's blanket code pending formal hearings before Deputy Industrial Administrator Malcolm Muir. The general code was drafted by a committee of the Construction League of the United States in a two-day meeting at Washington, D. C., with representatives of all branches of the construction industry, and will be supplemented by codes prepared by the various regional or class groups whose special problems and practises it was considered desirable to exclude from the general or master code.

### *Wages and Hours*

Except where other rates are established regionally or locally by mutual agreement between representative groups of employers and employees and approved by the President, as provided for by the National Recovery Act, the code establishes 40 cents an hour as the minimum wage, an average work week of 35 hours during any six months' period, with a maximum of 48 hours a week and 8 hours a day. It is understood that the provision with respect to hours of labor was suggested by NRA as preferable to the provision in the tentative code, as drafted by the League's committee, for a maximum of 40 hours a week but not more than 150 hours a month.

As a voluntary code, offered as a substitute for the President's blanket code, the construction code becomes effective upon the individual immediately upon signature by him, and as an industry code will become compulsory when signed by President Roosevelt. None of its provisions, however, is retroactive in either case; the code requirements apply only to new contracts entered into after the code shall have been approved.

**MEMBERS OF THE POLICY COMMITTEE OF THE CONSTRUCTION LEAGUE OF THE UNITED STATES**

August 1, 1933

**ALONZO J. HAMMOND**
*consulting engineer, Chicago, Ill., president of the American Society of Civil Engineers*

**E. J. RUSSELL**
*Mauran, Russell & Crowell, architects, St. Louis, Mo.*

**A. P. GREENSFELDER**
*Frum-Colnon Contracting Co., St. Louis, Mo.*

**J. C. BEBB**
*assistant to vice-president, Otis Elevator Co., New York, N. Y.*

**P. W. DONOGHUE**
*P. W. Donoghue Co., plumbing contractors, Boston, Mass.*

**MERRITT HARRISON**
*architect, Indianapolis, Ind.*

**W. G. LUCE**
*vice-president, Hegeman-Harris Co., builders, New York, N. Y.*

**A. E. HORST**
*secretary-treasurer, Henry W. Horst Co., engineering contractors, Philadelphia, Penn.*

**OSCAR A. REUM**
*plastering contractor, Chicago, Ill.*

**F. W. MORSE**
*eastern manager, Chamberlin Metal Weatherstrip Co., New York*

**F. P. BYINGTON**
*general manager, architects service dept., Johns-Manville Corp., asbestos products, New York, N. Y.*

**LION GARDINER**
*Lakewood Engineering Co., equipment manufacturers, Columbus, Ohio*

**C. G. CONLEY**
*Mt. Vernon Bridge Co., steel fabricators and erectors, Mt. Vernon, Ohio*

**CHARLES G. FANNING**
*cut stone contractor, Chicago, Ill.*

**E. J. MEHREN**
*president, Portland Cement Association, Chicago, Ill.*

**HERBERT S. CROCKER**
*consulting engineer, Denver, Colo.*

**T. H. CUTLER**
*chief engineer, Missouri State Highway Commission, Jefferson City, Mo.*

*(2 vacancies—probably Stephen F. Voorhees, architect, of Voorhees, Gmelin & Walker, New York, N. Y.; and a representative from the subcontractor group)*

### *Ban on Bid Peddling*

Before the code was submitted to NRA a provision was inserted prohibiting bid peddling and providing that all supplemental group or class of work codes should contain provisions to enforce this rule.

### *Code Administration*

Because of opposition to the code committee's proposal that the Construction League's policy committee should select an industrial control committee of eight members to administer the code, it was finally decided that the policy committee itself should serve as a National Industrial Administrative Committee, with three additional members to be appointed by NRA. This course was adopted because of lack of time in which to set up a representative committee on any other basis.

### *Committee Personnel*

The personnel of the Construction League's policy committee which will administer the code until the next election January 1, is given herewith. The meeting in Washington adopted a recommendation that the assembly of the Construction League should elect Stephen F. Voorhees, New York architect and chairman of the code committee, to a vacancy on the policy committee assignable to architects. One other vacancy is assignable to subcontractors.

It is hoped that formal public hearings on the code will be scheduled this month and that such supplemental codes as may be drafted by that time will be heard at the same time. Supplemental codes will not be held up until all have been filed. It was regarded as impractical to fix a date by which all supplemental codes should be filed.

The full text of the code, as submitted Aug. 1, to the National Recovery Administration, is reproduced on the next page.

# SUBMITTED TO N.R.A.

## League of U.S., Cover All Operating Elements of Sub-Contracting and Equipment and Material Supply

*Second Tentative Draft of Code Submitted for Consideration at Open Meeting of Construction League Held on August 1, 1933*

## *CODE OF FAIR COMPETITION FOR THE CONSTRUCTION INDUSTRY*

***Embracing the Elements of Design, General Contracting, Sub-Contracting and Supply***

TO EFFECTUATE the policy of Title I of the National Industrial Recovery Act during the period of the emergency, the Construction League of the United States, a membership organization of national trade associations and professional bodies, pursuant to the purpose of the construction industry to cooperate with the President of the United States, submits for approval, pursuant to Section 3 of the said Title,, the following Code of Fair Competition and plan for its administration for all construction work. It shall be supplemented by codes of fair competition to be submitted by the various representative national trade associations and professional bodies.

1. The Construction League of the United States imposes no inequitable restrictions to membership therein, and is truly representative as a national organization of the Construction Industry.

2. This Code will not promote monopolies or eliminate or oppress small enterprises and will not operate to discriminate against them and will tend to effectuate the policy of said Title I. It is expressly recognized that the President of the United States may, as a condition of his approval of this Code, impose such conditions (including requirements for the making of reports and the keeping of accounts) as may be expedient in the furtherance of the public interest for the protection of consumers, competitors, employees, and others, and may provide such exceptions to and exemptions from the provisions of this Code as the President of the United States in his discretion deems necessary to effectuate the policy herein declared.

3. To induce and maintain the united action of all elements of the Construction Industry under adequate governmental or private sanctions and supervision, to eliminate unfair competitive practices and to advance the public interest, to reduce and relieve unemployment, to improve standards of labor and living and otherwise to rehabilitate the Construction Industry, and effectuate the policies set forth in the National Industrial Recovery Act, this Code of Fair Competition governing the Construction Industry is adopted.

### *Definition*

4. The term "Construction Industry" as used herein is defined to mean the designing, the constructing, and the assembling, installing and applying of manufactured parts and products and the supplying of materials of (a) building structures, including modifications thereof and fixed accessories thereto, intended for use as shelter; and (b) fixed structures and other fixed improvements and modifications thereof intended for use in sanitation, transportation, communications, flood control and water power development, reclamation and other similar services required for the public welfare; and the term "Construction Industry" is further defined to include those persons who perform such functions, being commonly known and sometimes defined by law, as architects, engineers, contractors, sub-contractors, producers, fabricators and distributors. The term "person" as used herein is taken to mean a natural person, partnership, company, association, corporation or agency.

5. Employees shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from the interference, restraint, or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection.

6. No employee and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing, or assisting a labor organization of his own choosing.

7. Employers shall comply with the maximum hours of labor, minimum rates of pay and other conditions of employment, approved or prescribed by the President.

### *Minimum Wages*

8. Employers in the Construction Industry shall pay wages not less than the minimum rates which are established regionally or locally by mutual agreements between truly representative groups of employers and employees and approved by the President, as provided by Section 7 (b) of the National Industrial Recovery Act. Where such rates are not so established the minimum rate of wages shall be not less than forty cents (40¢) per hour, unless the hourly rate for the same class of work on July 15, 1929, was less than forty cents (40¢) per hour, in which case the hourly rate shall be not less than that of July 15, 1929, and in no event less than that of thirty cents (30¢) per hour, except where a lower minimum rate has been otherwise established for specific projects by competent governmental authority acting in accordance with law.

### *Maximum Hours*

9. Employers within the Construction Industry shall not require any individual directly employed on any construction project to work more than an average of thirty-five (35) hours a week for any six months' period but with the right to work a maximum week of forty-eight (48) hours in such period but not more than eight (8) hours in any one day, except those in executive, administrative and supervisory positions, and except in cases of emergency requiring the protection of life or property.

10. Nothing herein shall be construed as preventing voluntary agreements establishing a lesser maximum number of hours as provided in the National Industrial Recovery Act.

11. Employers in the Construction Industry shall not employ any minor under the age of sixteen (16) years unless otherwise provided in State laws.

12. The President of the United States may cancel or modify any provision in this Code of Fair Competition for the Construction Industry.

13. Amendments or revisions may be proposed by any party of interest and when within the Construction Industry such proposals shall be made through the national trade association or professional body representative of that function within the Construction Industry to which the proponent is classified.

### *Administration Committee*

14. To effectuate the purposes of this Code and provide for administration within the industry, there is established a "National Industrial Administrative Committee" which shall be the Policy Committee of the Construction League of the United States and three members to be appointed by the Administrator of the National Recovery Act. This Committee shall have authority to establish sub-committees and local, State or regional committees, sub-committees or agencies, with such delegated powers, as it may deem necessary. This Committee may from time to time present to the Administrator recommendations based on conditions in the industry as they may develop, which will tend to effectuate the operation of the provisions of this Code and such supplemental codes proposed or made a part of this Code and the policy of the National Industrial Recovery Act.

### *Supplemental Codes*

15. It is intended that this Code for the Construction Industry be amplified and expanded by supplemental Codes prepared and proposed by national trade associations and professional bodies within the Construction Industry representative of the various functions of the Construction Industry or subdivisions thereof. These supplemental Codes shall be administered by their own administration committees or agencies which in turn may appeal to the National Administrative Committee herein established in the event of any controversy arising under the National Industrial Recovery Act.

16. Supplemental codes prepared by national trade associations or professional bodies within the Construction Industry may be proposed to the Administrator of the National Industrial Recovery Act by the National Administrative Committee of the Construction Industry when consistent with this Code and other rules or regulations promulgated by the President and with the spirit and purpose of the National Industrial Recovery Act. Nothing herein contained shall be construed to prevent a trade association from submitting a code to the National Administrator direct.

17. No one in the Construction Industry shall be a party to the unfair practice known throughout the industry as "Bid Peddling". All supplemental codes before receiving the approval of the National Administrative Committee shall contain provisions to enforce this rule.

### *Administrative Expense*

18. All persons as defined in this Code shall bear their proportionate share of the expense incident to securing the approval of and administration of this Code of Fair Competition under such rules and regulations as may be approved by the President under Section 10 (a) of Title I of the National Industrial Recovery Act.

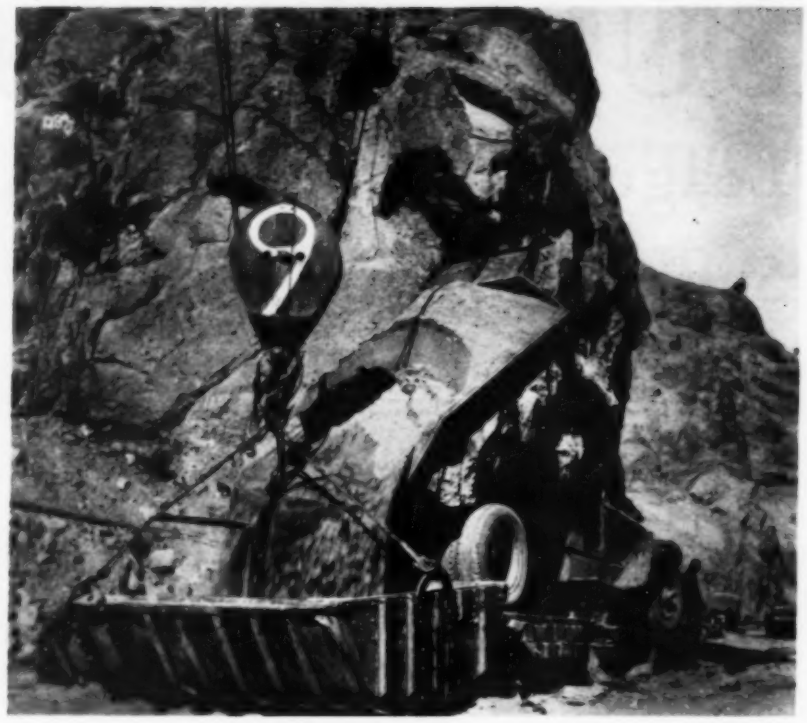
### *Effective Date*

19. This Code shall become effective on approval by the President of the United States and shall be applicable to all construction work undertaken pursuant to contracts entered into or otherwise commenced after such approval date.

# *Getting Down to*

# DETAILS

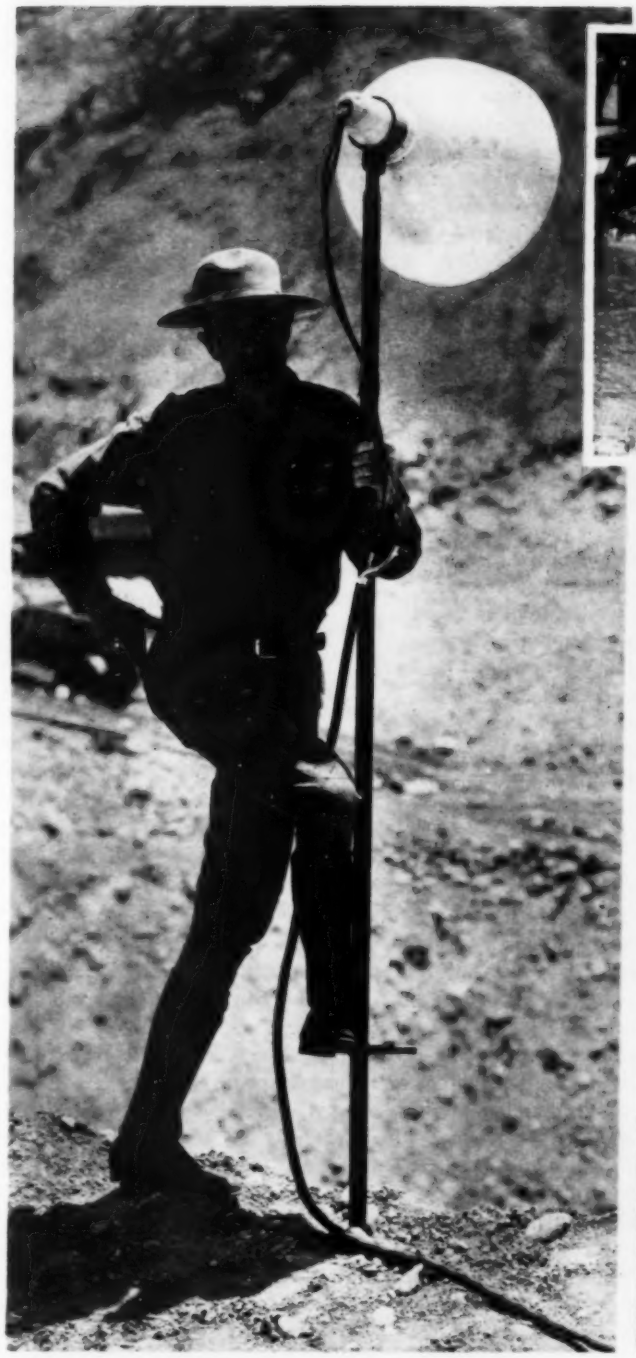
[ Close-up Shots of Job Methods and Equipment ]



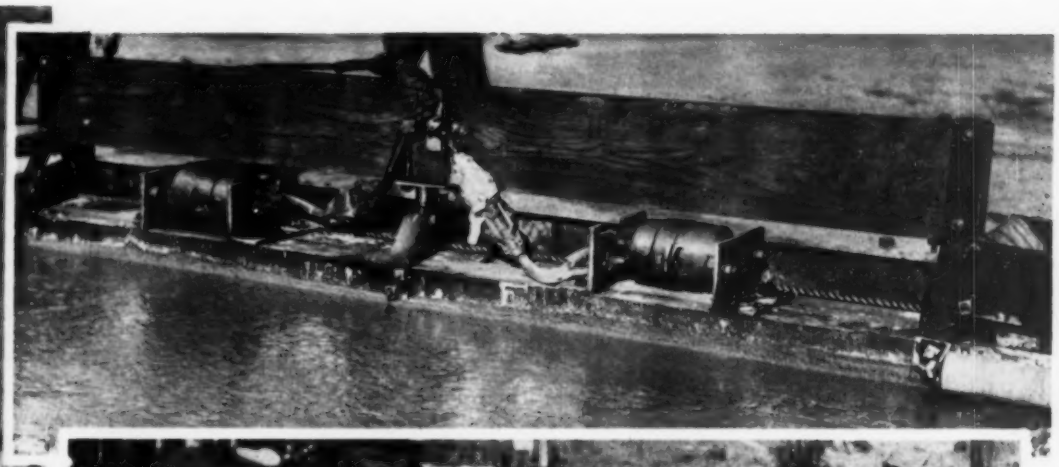
SKIP *(right)* for transporting material by cableway across Colorado River Canyon at Boulder dam is improvised by Six Companies Inc., contractors, from motor-truck body to which three handles are attached. Skips are easily handled and dumped.

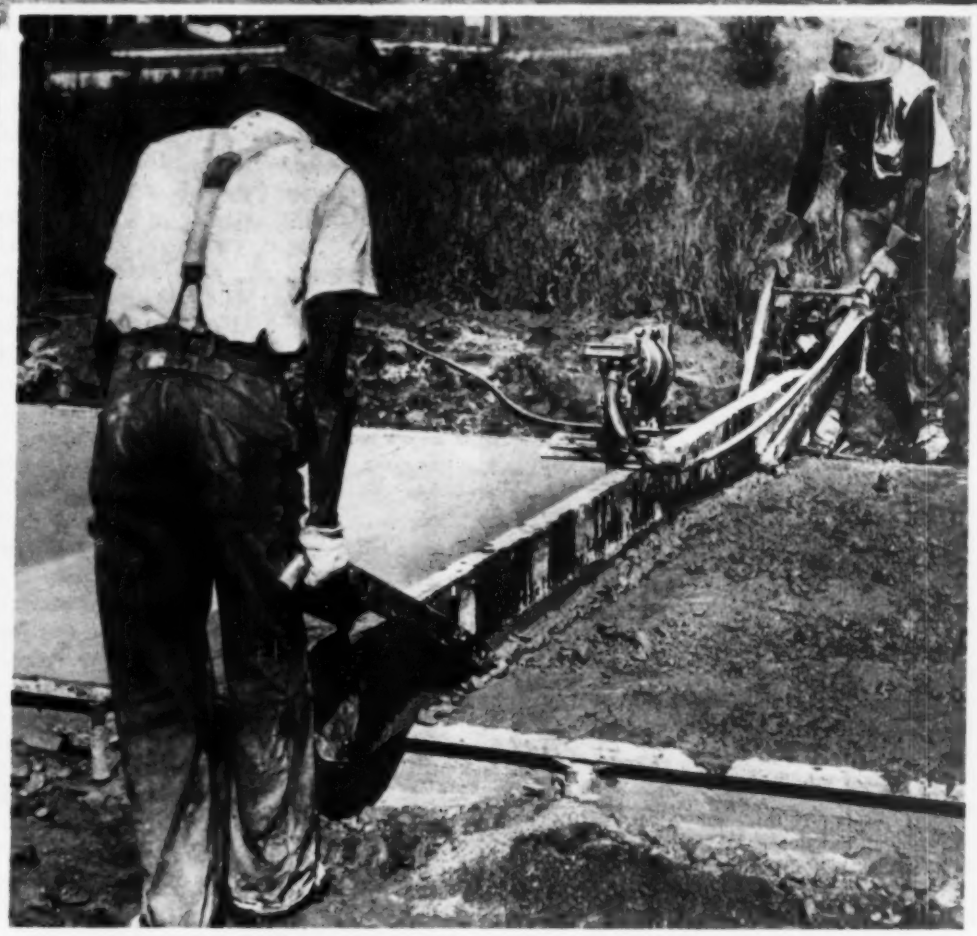
TRAVELING OIL MIX PLANT, hauled by Allis-Chalmers tractor, builds bituminous road surfaces by continuous method in California. Gravel, spread in windrows on subgrade, is picked up and deposited in mixing compartment where heated oil is applied under pressure. Power for mixing is supplied through take-off shaft from tractor. Mixture is discharged at rear, ready for spreading by blade grader and rolling to proper thickness. Special gears on tractor produce traveling speed of ½ mi. per hour. Oil tank at rear is filled, while moving forward, by tank trucks. Plant design by Clyde Wood, contractor, of Stockton, Calif.

SIMPLE WOODEN TEMPLET, equipped with carpenter's level, provides quick and effective method of gaging 1 on 2 earth slopes specified on one of the Lane Construction Corporation's road-building jobs in Rhode Island. In the two illustrations above, H. E. Brown, field superintendent for the Lane organization, demonstrates how the templet is used to check inclination of cuts or fills.



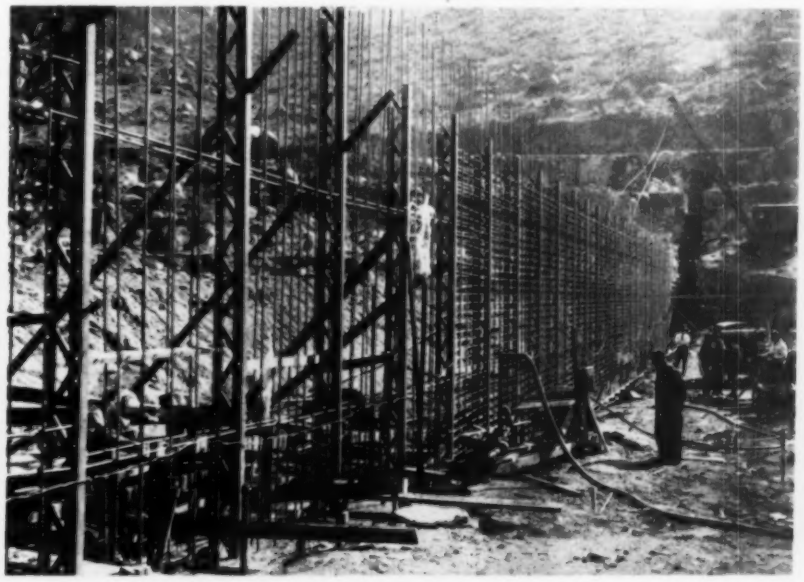
HOMEMADE STANDARD, developed by West Slope Construction Co., simplifies setting and moving of electric flood lights for night work on San Gabriel dam No. 1 in California.





VIBRATING SCREEDS facilitate tamping and finishing of dry, stiff concrete pavement mixes and increase strength of slab. *(Upper photo)* Heavy double vibrator on 12-ft. winch-hauled screed for New Jersey Highway. *(Lower photo)* Vibrator attached to strike-off board of 9-ft. hand screed on Philadelphia street paving.

TRIANGULAR TIMBER BENT, resting on rock bottom of stream and supporting line of lighter timber posts, carries concrete arch rib for Indiana Engineering & Construction Co., of Akron, Ohio, on bridge widening project for Ohio State Highway Department.



COREWALL STEEL of ⅞-in. vertical and horizontal rods is supported by latticed posts spaced 8 ft. apart on El Capitan hydraulic-fill dam for San Diego, Calif. Reinforced corewall 18 in. thick is carried up 10 ft. into main body of 217-ft. structure. Contractors, H. W. Rohl and T. E. Connolly.

## XI—Relations With Employees

# Helps to Successful Contracting

**Eleventh of a series of articles on applying business principles to construction and making profits by avoiding costly mistakes**

By HARRY O. LOCHER

*Contractor, New York*

WE now come to the most vital thing in contract work, as in all work: the human element. Even with ample capital, splendid equipment, and a fine contract at good prices, results are still up to the men. In the fifth installment of this series, "Selecting an Organization", (*Construction Methods;* February, 1933) we touched upon the question of men. Let's go deeper into it, starting with the superintendent, "the man who will attend to it."

*Incompatability*—On a change-of-line railroad job an energetic but impulsive superintendent was in charge of all shovel work. He was a go-getter and always after records. The job extended over a good many miles and there was a general superintendent who covered the whole line. He was a capable but tactless man. Every time he reached our energetic young superintendent's job sparks would fly. He would change this, that and the other thing, not so much for logical reason, but just on general principles. After his departure the superintendent would invariably say, "That old square-head can undo more in two hours than I can get back together in a week." And the general superintendent would usually punctuate his departure with, "He's the hardest bird to get to do things the way I want them done I ever saw."

Fortunately, they were both good enough construction men to recognize each other's ability and what they said was more of a "popping off" than anything else. The job superintendent would hardly recover his poise before the traveling "super" swooped down on him again and things broke out afresh. Now, here were two cracking good men, but both were lacking in tact and cooperative spirit. This particular job went along fairly well, but many another dollar would have been earned had these two superintendents been tactful and broad enough to have recognized and appreciated each other's "tender spot" and avoided constant picking away at it.

*Get-Together Meetings*—It is an amazing thing that on so few construction jobs are the responsible men gathered together at regular times to discuss situations out on the work. Harmony, whole-hearted cooperation and openness are the very life blood of a job. Unless there are get-together meetings, in which the contractor or superintendent is present and encourages the key men to talk, make suggestions and bare their grievances, real or unreal, there is every probability that conditions will arise, ranging from petty to grave, which will cost the contractor money, varying from small amounts to, possibly, a tremendous loss on his job. Give us a few examples, you say.

On two adjoining jobs the hired trucks were under the direction of one man. He made his headquarters on one of the jobs and was under the direction of the superintendent of that job. At the dump one day he came upon a number of truck drivers from the other work killing time after dumping their loads and not getting away as promptly as they should. He "hopped on 'em", thinking he was well within his authority and working for the interests of his employers. A few days later word came to him from the superintendent of the other job to "lay off his truck drivers." He did, remarking, "I don't give a damn if they stick around the dump the whole day."

This situation cost the contractors money. Here were two men with ability, but miserable cooperators and woefully lacking in tact and diplomacy. Had meetings been held, this situation would have come out and been corrected. It should have come out anyway.

**"Decision is a trait admired and respected in any man by those who serve under him, beginning with the laborer for the foreman and so on, to the top."**

A smooth-running organization is too often taken for granted. When progress is not what it should be, when costs are high and profit disappointing, when things just don't seem to be "clicking," dig into the workings of the organization and clean house where it is found necessary. Put the chronic trouble-makers on the road, and build up a loyal, smooth-running, organization.

Especially during these days of close bidding and prices an organization has got to function and work together as smoothly as gears in oil, if you expect to come out ahead. It gets back always to leadership. And usually this leadership is in the superintendent—the kind of superintendent we talked about in our fifth article, previously referred to, a superintendent with experience and "guts", who knows all the ins and outs, and where the rubs are apt to be and kills 'em off before they grow to harmful size. You can't expect such action from a colorless, apathetic, hesitant type of man, although there are times when such a man succeeds in getting his silence, reserve and assumed wisdom across as great profoundness. In such cases it simply means a man not fitted for the place. He may be a crackerjack somewhere, but he's no good as a vibrant leader of men. Here, we need a man alive, who can snap out "yes" and "no" in a way that carries decision and the implication of knowing what he's talking about. Such a man has both the confidence and respect of all men under him. All good construction men like clean-cut, decisive instructions and have slight regard for the easy-going, apathetic, "never-make-up-his-mind" type of man. Decision is a trait admired and respected in any man by those who serve under him, beginning with the laborer for the foreman and so on to the top.

*Lack of Nerve*—A superintendent was asked by a subordinate if there were not too many men at a certain rate of pay in a crew doing special work. He replied that there were, far too many, but that it might make trouble if it were brought to the contractor's attention. Trouble! Here was a superintendent who knew that a condition existed which was grossly wrong and costing his employer money, yet he was afraid if he uncovered it, it would cause trouble. He simply lacked nerve. This situation would have come out had meetings been held and all men in authority been encouraged to get things "off their chest," without the least fear of injuring their standing or of incurring prejudice or disfavor from those above them. What we like to hear, rather than what we should hear, too often leads us astray and keeps smoldering and under cover things that are disrupting what might be a smooth-working organization.

*Selecting a Foreman*—Just any sort of a man, if he stands out a little from the others, some think, will make a foreman. He may and he may not. Selecting a foreman is no minor matter. Unless carefully supervised a great many of them are notorious non-cooperators, although not exactly in a malicious way. There just seems to be a natural spirit of envy among a great many of them. Turn it into a friendly, cooperative rivalry.

On one job a tactful superintendent so handled several foremen doing the same kind of work, the quantity of which could be easily measured from day to day, that they made friendly bets as to who would accomplish most each week. The superintendent used every care to see that each foreman received the same treatment as to getting materials. There was a splendid cooperative spirit between them, and how it did reflect in what they did! This superintendent deliberately made ways for one foreman to say something good about another, even if he had to put the words into his mouth and then take them out again. Then he would pass the word along.

You can build good will if you deliberately make a study of it, but rarely does it grow unaided or unencouraged. Too often do foremen deliberately put obstacles in one another's path, and unless this spirit is killed off and a cooperative spirit built up in its stead it jolts the contractor's bank account. Foremen should be chosen for their energy, honesty, earnestness, and ability to get a fair amount of work from their men. With these traits a good superintendent can make them important and effective in his organization, and not just men working a crew of other men.

**"You can build good will if you deliberately make a study of it, but rarely does it grow unaided or unencouraged."**

*Mechanics*—A derrick was being hurriedly set up. The man in charge was not as experienced and well versed in rigging as he should have been. He knew this, but there was no one around to consult at the time, so when he found the mast-head casting missing he thought a happy idea had come to him when he decided to use a heavy cast-iron sheave with spokes in lieu of the missing casting. At the first lift the cast sheave snapped and down came the fine steel derrick, parts of it twisted beyond repair and damaging other equipment in its fall. All on account of lack of experience and knowledge.

Experience and knowledge are major things in mechanical men. Even a good superintendent can't teach them—it's out of his line. They have to learn it themselves, but some of them graduate too soon. Good mechanical and machine men are usually proud of their skill and are touchy about being told in detail by some superintendent or foreman, not mechanically bent, how their work should be done. A good mechanical man or machine operator who knows his stuff likes to feel that his employer or the superintendent has confidence in him, is willing to let him

go ahead and work out the details of his problems, and is big enough not to try and claim the credit for what the mechanic has done.

It takes a real, bang-up superintendent to keep a lot of machine operators working together for maximum results, but it can be done by fairness all around, by slipping in a smoothing word here and there, by drawing out something commendable from one man about another and tactfully passing it along, and by getting the men together occasionally and impressing upon them the vital importance of cooperation, and the disastrous results which almost always follow the lack of it. Sometimes a man is just "agin" everybody and everything. The spirit of cooperation is not in him. When you discover such a man in your organization the quicker you get rid of him the better. He's apt to be the rotten apple that spoils the whole barrel.

Here, again, leadership comes in. Good leadership is the medicine for most cases. Some operators and machine men are crackerjacks under certain superintendents, and useless under others. Too many superintendents jump to the conclusion that an operator is "no good" without making the slightest effort to discover what the real trouble is. Man-building, organization-building, is a job in itself. Good results do not just happen; you have to bring them about; you have to find out the whys and the wherefores.

There is nothing that so much puts a good man on his mettle as to be told to go ahead and try "his plan". It's his baby then, and he'll split things wide open to rear it. This applies from the top to the bottom of an organization, and includes every kind of worker.

We have already said something about the importance of a superintendent working through his master mechanic in dealing with machine men. If this is done and the head mechanic is the type he should be, there will be little trouble at this point. If the job is not large enough to require the services of a master mechanic, a good, tactful superintendent, keeping in mind the points we have mentioned, can keep harmony among and get fine results from the boys pulling the levers and looking out for the equipment.

*The Office Force*—"I am the last man to hit the job and usually the first one to leave at the finish," an old-time construction work bookkeeper said one day. "When I pull in I have a thunder of a time getting things together, checked up and straightened out. Then, near the end, they shunt me along somewhere else before I can get things straightened out and wound up." He was describing a situation that was hugging the truth mighty close in many cases. In some concerns the office force rarely gets the recognition and consideration it deserves. From the standpoint of recognition and appreciation it is too frequently subordinated to the "outside end."

If a superintendent or foreman—or the contractor—stays with the job from two to five hours extra every day, walking up and down the line (which he generally prefers doing to going inside), he is usually, and justly, hailed as a "hard worker". But the office man who hangs over his table many extra hours, when he would prefer to be out in the open, is a hard worker, too, and one who, too often, gets scant material recognition for it. He's just supposed to do that.

**"Good mechanical and machine men are usually proud of their skill and are touchy about being told in detail by some superintendent or foreman how their work should be done."**

If the outside man goes away for a day or a week, or is laid up, he has nothing to catch up with when he returns—he just picks up where he left off. Not so with many office men, especially on the small and medium-size jobs where little of the work is delegated. When they are absent their work piles up and they have it on their hands when they return. The good office man deserves more credit than he usually gets, and the withholding of this credit oftentimes is a damper on complete esprit de corps which ultimately finds its way into the profit-and-loss account.

"I can't handle all this work alone," an office man on a medium-size job said, "even if I stay up until midnight every night." He could get no additional help, became dissatisfied, thought his compensation too small. Finally, one morning, he was missing, along with about $2,200 of his employer's money. This may be an isolated example, but the point is that the office men are vitally important cogs in the complete machine. Unless they are lubricated, by proper recognition and compensation, the machine is apt to "squeak".

*Recognition for Able Men*—An old-time contractor was discussing how he compensated men of proved ability and all-around worth. He made partners of them and rewarded them according to the results they produced—and they usually did produce. He touched on a point which it would be well for young construction men to bear in mind. He pointed out that many a capable, loyal young man is kept in a subordinate position too long by a thoughtless, selfish employer for the simple reason that he is "good" there, and changing and promoting him would cause temporary inconvenience. In most cases, he went on, the loyal young fellow sticks, thinking in the end that things will work out all right. Sometimes they do. But often a young man wakes up some morning, after living in hopes in a subordinate position or helping ride his employer's hobby, to find that his employer has decided to close up shop or enter a partnership in which there will be no place for him—and he's out and back where he started, say, six years ago.

The young man could have learned all there was to that particular job in two years or so, but he was kept in it because he was good at it, and he stayed in it because he thought things would come out all right. He might better have got out long ago and sowed his seed in more fertile ground. Ambitious young men should watch out for this. While doing the work in hand to the very best of their ability they should keep a lookout ahead and avoid blind alleys and disappointments. So, try to sow your seed in fertile ground.

Unless outstanding loyalty, ability and dead-in-earnest interest is rewarded, it cannot be retained—you cannot hold the really good men in your organization. What satisfies the mediocre man does not satisfy the ambitious man and at the first opportunity for betterment he leaves you.

Proper recognition and consideration of such men pays over and over again. It arouses, stimulates and brings out all the good that's in a man. He's for you. At a certain period during the lifetime of one great contractor there were more than seventy men who could call themselves his partners. He was a builder of men, as well as of tunnels, bridges and dams. It is an irrefutable truth that "cheap" men are "expensive" men. Often your highest priced man is the best investment you have. Of course, well-paid men must be selected with scrupulous care, and there must be no doubt about their ability to produce, but such men usually save you money every time they turn around.

**"Many a capable, loyal young man is kept in a subordinate position too long by a thoughtless, selfish employer for the simple reason that he is 'good' there and promoting him would cause temporary inconvenience."**

*Good Workmanship*—One great contractor stimulated his men by his great pride in good workmanship, "doing things better than good enough." He was proud of his work and this pride always spread through his organizations; it was "how well" as well as "how much" could be done. He believed that work well done cost less than slovenly work, and proved it by earning a national reputation and a fortune.

Slovenly work leads to slovenliness in every direction and sooner than you realize it there is a looseness in an organization than kills morale and costs money. Proper example from the top—the contractor or his superintendent—is vitally important in preventing this disaster. Proper morale cannot exist without it. On one job the engineer in charge had his disgust so thoroughly aroused by the contractor's superintendent lying around the bunk houses at night, drinking and gambling with the foreign foremen and laborers, that his attitude vitally and most adversely affected the relationship between his entire organization and the contractor's. Good example is a mighty influence, particularly if exhibited by a man of lofty and dominant character. When a man in authority so orders his conduct as to lose the respect and confidence of the men under him, his sun has set. He may think he's getting results, but at every opportunity, whenever his back is turned, they are "laying down on him."

There is no better creator of good will than for men in authority to take a friendly interest in the welfare of the men under them. There are many ways of doing it, but too few do it. One capable superintendent built up an amazing amount of loyalty and good will by giving minute, detailed attention toward securing comforts and conveniences for those families who lived in camp, adding a great deal to their wellbeing and contentment. He was equally solicitous about the wellbeing of the unmarried men. Good men like to be noticed and have some attention and interest shown in them. They intuitively gravitate to the places where they find these things. It isn't much trouble to be sincerely interested in people, and few things are more appreciated or yield more satisfactory results.

This point of friendliness recalls to mind the remark of an old-time shovel runner about a contractor for whom he had a great liking and admiration. "I do more work for him for less money than any man I ever worked for," he said with a grin. He did not mean that this contractor paid less than was customary, but that he turned out much more work for him than he did elsewhere for the same wage. He appreciated the way he was treated and his every impulse responded to it.

To withhold or steal credit due another man is one sure way to destroy his interest and loyalty. He resents such treatment bitterly, and oftentimes the injustice is paid for dearly. Give a man credit for what he does and he will keep doing.

*Union Relations*—It is unfortunate that unionized labor and contractors still seem far apart in certain convictions and conclusions which prevent complete harmony in their relations. Humane and broadminded contractors understand and appreciate the purposes of the leaders in labor organizations and are in sympathy with them. What they often resent, however, are the methods sometimes adopted by minor union officials which seriously interfere with the smooth functioning of their organizations. They resent, too, the costly situations they are forced into as a result of inter-union squabbles for

which no action of theirs is responsible. They have no patience with a ridiculous and arbitrary ruling that prevents a man of one craft from turning in and putting his shoulder to the wheel in another class of work, particularly when work in his own class is slack and there is need for his help in other directions.

Again, contractors resent the attempt to force them to use men who are not fully competent to do the work they hire out for. A master mechanic was watching a floundering, awkward shovel-runner attempting to load earth into trucks and spreading it all over the place. A union delegate happened on the scene. "Why don't you union fellows buy a 10-acre lot and a few shovels and teach a man how to run one before you recommend him," the master mechanic snapped. "That fellow seems like a decent chap, said he wasn't very familiar with this type of shovel, but that he would do the best he could. His not knowing his business is going to cost us a nice chunk of money."

"We thought he was all right," the delegate returned.

"That's the trouble, you thought so," the mechanic came back. "You should have known so. Until you do, you can't expect us fellows to be all pepped up about your union. If that man had been given his choice, he probably would have said he couldn't have handled this shovel properly right off the bat. But you fellows force 'em out and shove 'em on a machine, whether they can handle it or not."

Other tactics of some of the lesser lights in unions—often with the connivance of contractors' men who are grossly disloyal — will not stand the glaring light of day, particularly as to the hiring and firing of men, making of them pitiful dupes between a pair of wolves.

The most wholesome thing that could happen with reference to union labor would be for some of the humane, lofty, common-sense purposes and methods which imbue the topmost leaders to be brought down and diffused among those who actually contact the workers and the contractors' responsible men. Exploitation and violation of high union principles by renegades should be dealt with mercilessly. No organization, be it union or otherwise, can possibly thrive when within its ranks exploitation, unjust coercion and the making of human beings into pawns is tolerated. The leaders of organized labor in America have a stupendous task before them, particularly in view of events of the past three years. If they proceed with justice and fairness to all they can depend upon the cooperation of such employers as have the real interest of the American workers at heart—and they are legion.

NEXT MONTH—The twelfth article in this series by Mr. Locher will discuss "Surety Bonds."

# ATLANTA POST-OFFICE

## *Site Offers Scant Space for Storing Materials*

CONSTRUCTION of Atlanta's new $3,000,000 nine-story post office and Federal building has helped considerably during the past year in relieving unemployment in the building trades in that city. With practically all the materials used, except the structural steel, coming from local sources, other lines of industry in the vicinity also have been benefitted importantly by this project.

Located across a street and a small plaza from the union railroad passenger terminal, the new post office will have uninterrupted access to track levels in the terminal through a subway connecting the ground floors of the two buildings. Most of the mail handling in the post office will be done on the first and second floors. The latter are both 220x390 ft. in plan, with the unusual story heights of 25 and 22 ft., respectively. Setbacks above the second floor reduce the area of the upper stories.

Concrete footings in circular caissons, sunk to bedrock 60 ft. below the

WITH BOOM REMOVED *(right)* portable steel-frame hoist, operated by one man, handles 2-ton marble facing block.

WITH REMOVABLE BOOM IN PLACE, hand hoist sets stone without resort to guys or anchorage. Temporary counterweight under drum assures stability. Two men can pick up and move hoist with ease.

surface, carry the structure. The latter has a steel frame fireproofed with concrete. Up to the first story the exterior is Georgia granite, with Georgia marble above that.

Space at street level for storage of materials for the 20,000 cu.yd. of concrete involved was lacking at the site. The Great Lakes Construction Co., of Chicago, general contractor on the building, adopted a concrete mixing and placing layout, however, that eliminated all storage of materials at the job, except that provided in charging bins over the mixer. This set-up also avoided all rehandling of materials. It further permitted the mixer to be set at the ground level without a sump. A street viaduct along one side of the building site made this plant layout possible.

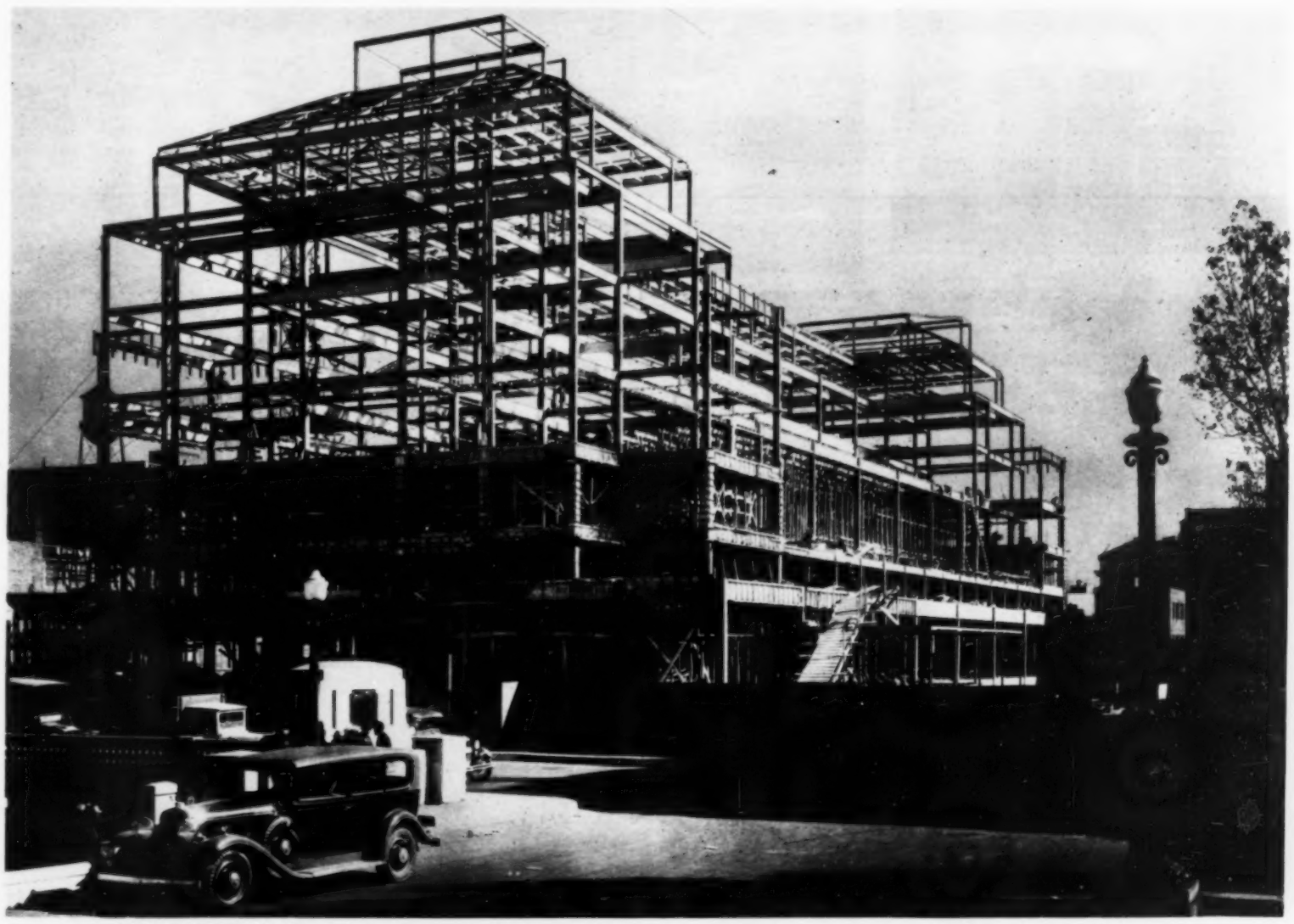
The plant was set back from the viaduct far enough to permit trucks delivering the concrete materials from local dealers' supply bins a few blocks away at railroad sidings to back in off the street and dump directly into the bins over the mixer. The materials were then fed to the mixer by gravity. The mixer discharged into a skip in a steel hoist tower at the side of the building. Concrete was delivered from the tower at each floor level to place in the forms by buggies.

The trucks in which material deliveries were made operated through comparatively heavy street traffic. At the job it also was necessary to avoid hindrance to traffic on the viaduct. The bins over the mixer held about enough materials for an hour's run. Working on this close margin, materials were easily handled so that the mixing plant was never held up for lack of supplies.

Setting of the large quantities of stone facing and trim on the building has been simplified by the use of several light, portable steel-frame handhoist units designed by the Wilson Winfrey Co., of Shreveport, La., contractor for the stone-setting on the job. Two typical uses of these units, shown in accompanying illustrations, are among various adaptations of them on this class of work.

Otto Sands is superintendent, in charge of the project for the Great Lakes Construction Co. The National Construction Co., of Washington, D. C., under a separate contract, handled the excavation, the caissons, footings and subway connection to the terminal.

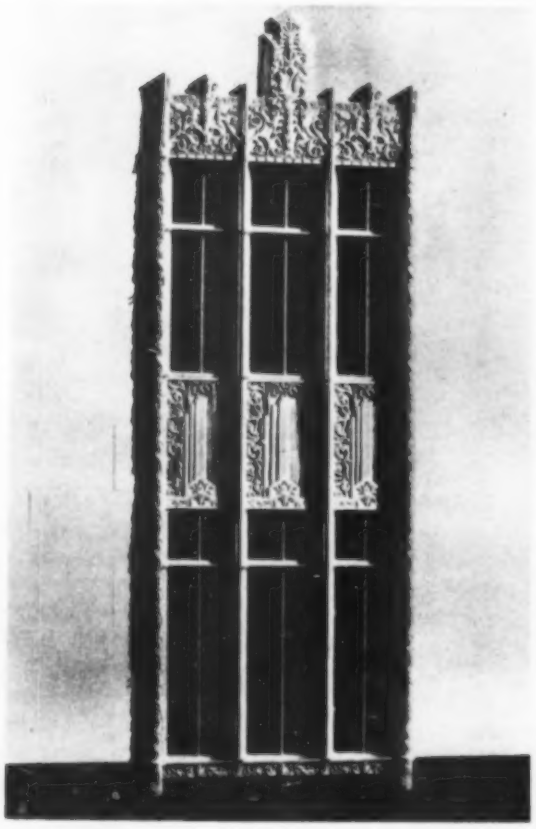
**CONCRETE MIXING PLANT *(right)*, with top of bin at viaduct level, receives aggregate dumped from truck. No material storage or rehandling. Mixer at ground level discharges into skip of steel hoist tower.**

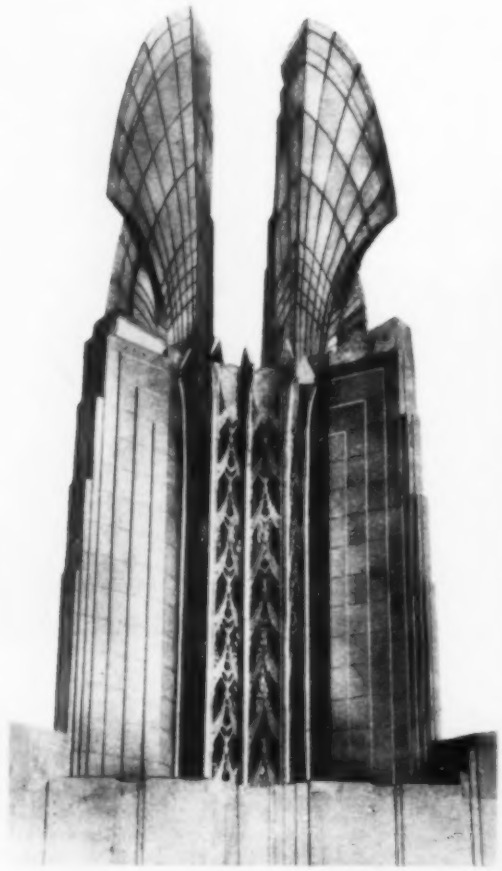


**FRAMEWORK of Atlanta's $3,000,000 post office is steel skeleton fireproofed with concrete. Story heights on first two floors are 25 and 22 ft., with setbacks above second floor. Ground area of structure is 220x390 ft.**

# Aluminum
## *in Building Construction*

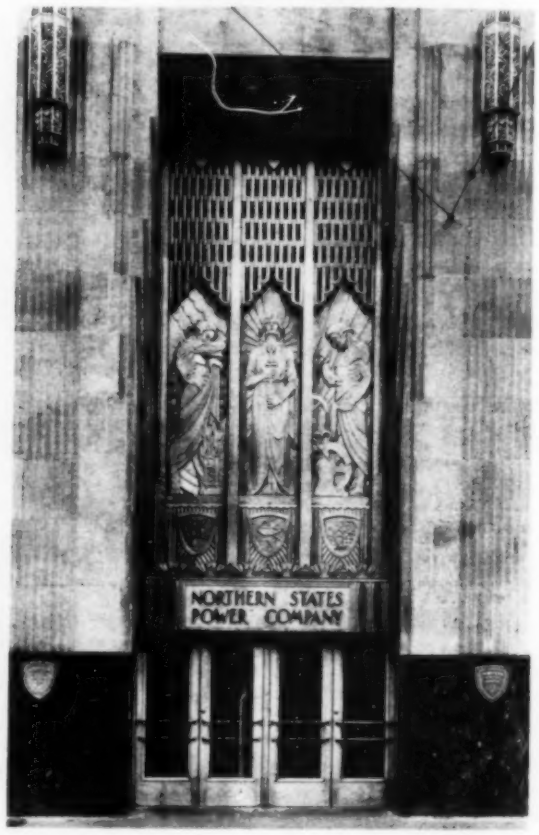
EFFECTIVE ENTRANCE *(below)* done in satin-finish aluminum for Northern States Power Building, St. Paul, Minn. Architects, Ellerbe & Co., St. Paul.

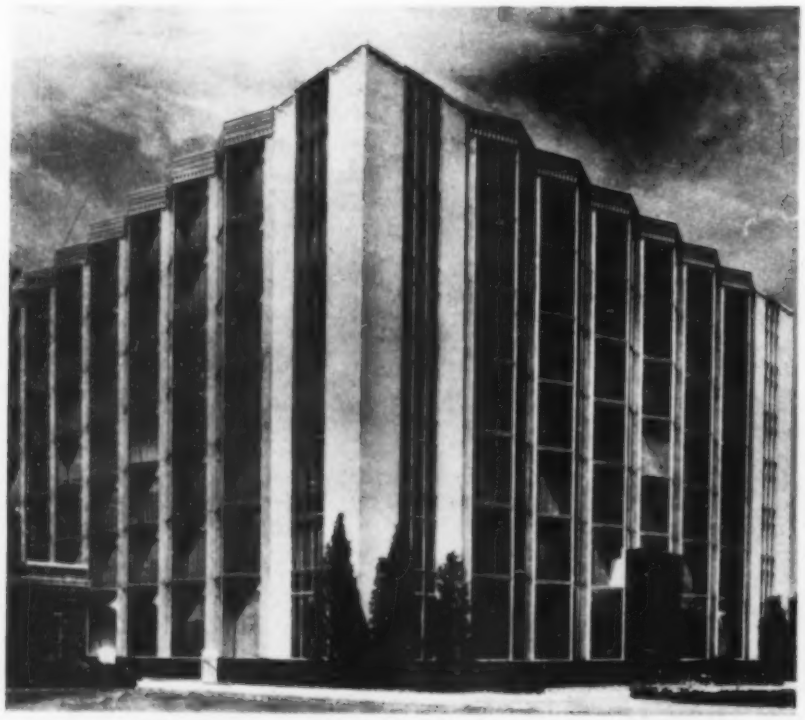




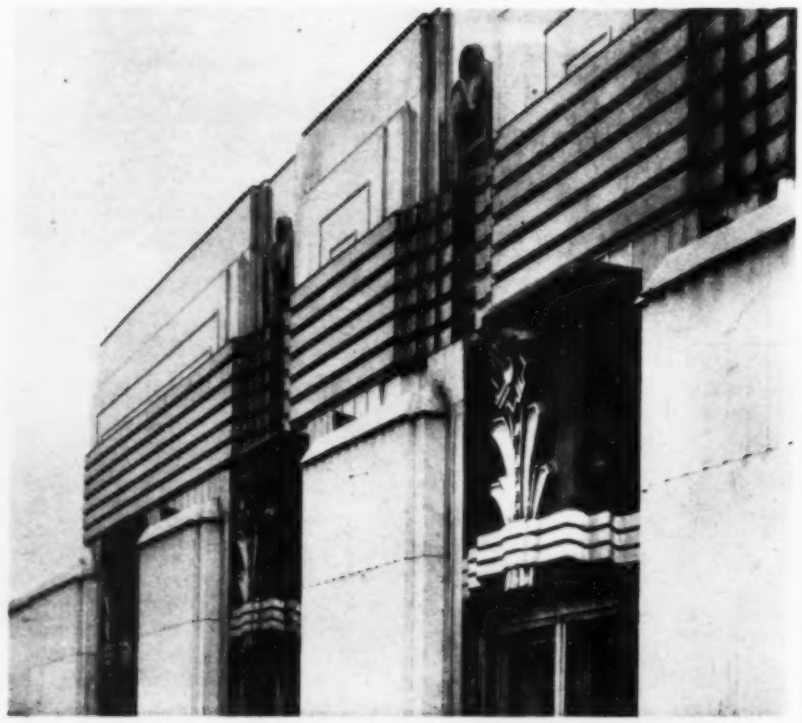
"WINGS OF PROGRESS". Cast aluminum used for exterior grilles and wing details, Genesee Valley Trust Co. Building, Rochester, N. Y. Architects, Gmelin & Walker, New York.

ORNAMENTAL WINDOWS *(below)* with spandrels of cast aluminum, First National Bank Building, Oklahoma City. Architects, Weary & Alford, Chicago.



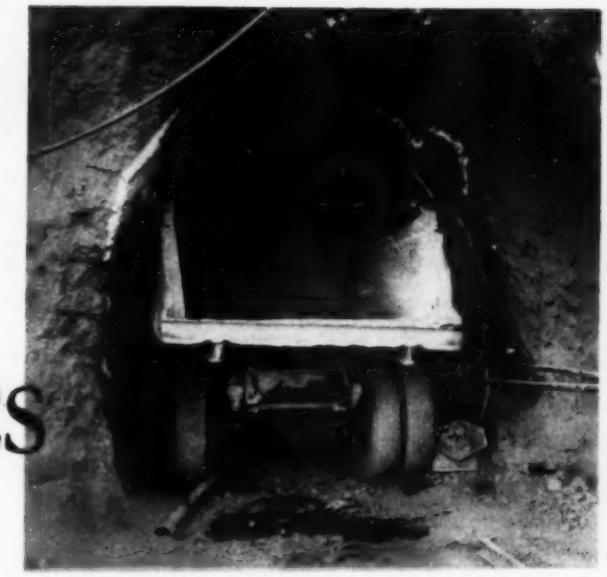
FACED with aluminum and glass. Engineering and Research Building of A. O. Smith Corp., Milwaukee. Architects, Holabird & Root, Chicago.



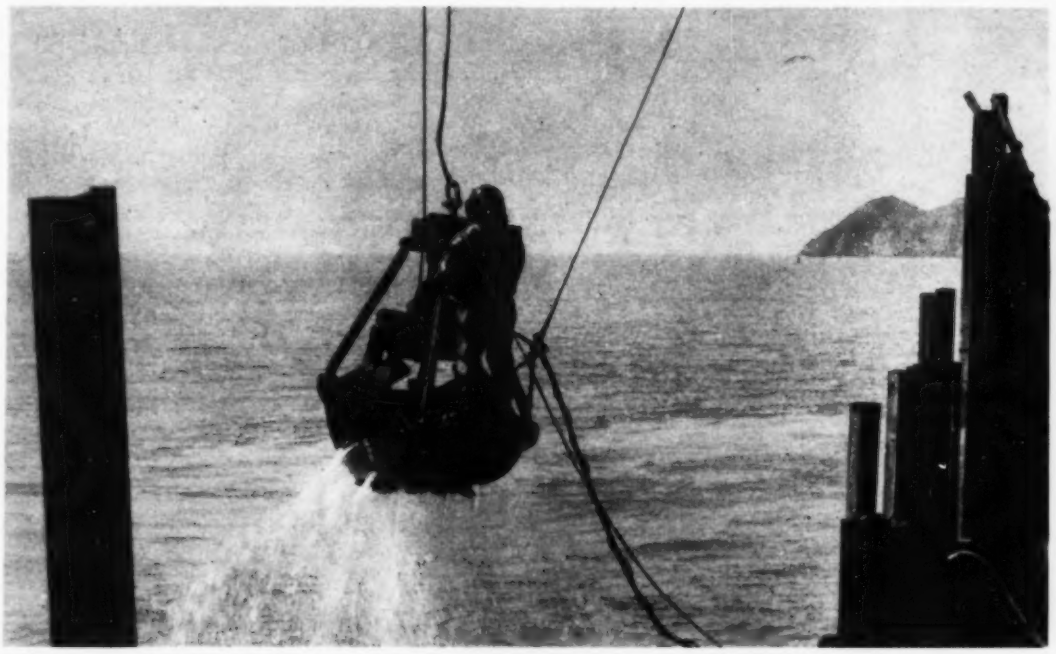
SHEETS of aluminum-manganese alloy form extruded molding at top of building for Pittsburgh branch of Federal Reserve Bank of Cleveland. Spandrels of cast aluminum. Architects, Walker & Weeks, Cleveland. Contractor, Mellon-Stuart Co., Pittsburgh.

# JOB ODDITIES

**A Monthly Page of Unusual Features of Construction**

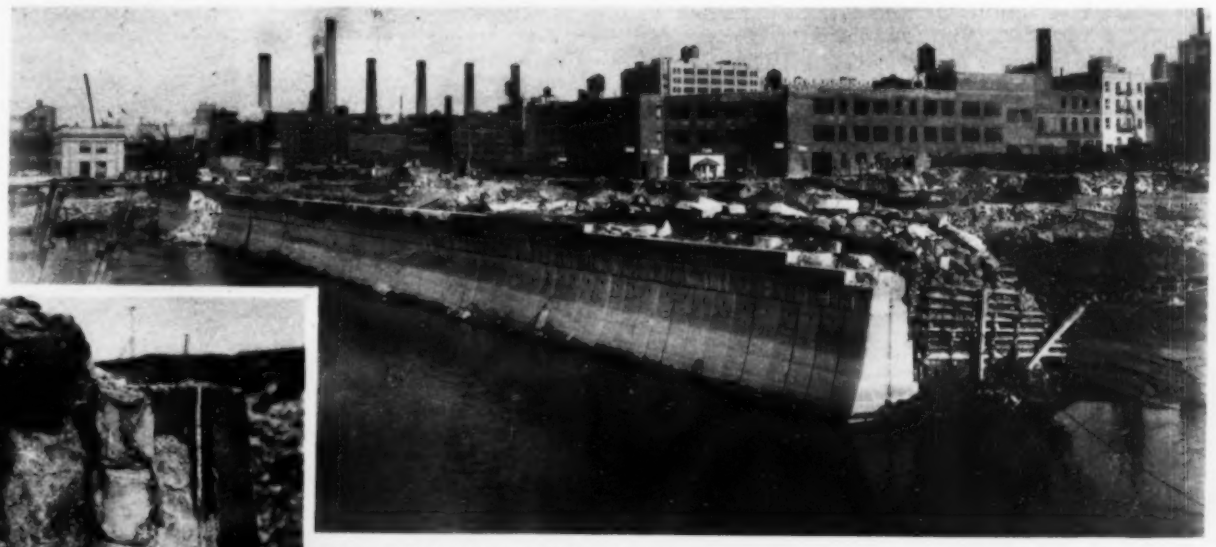


A TIGHT FIT. Outlet tunnels, 11 ft. in diameter, at Boulder dam offer scant clearance for trucks of Six Companies Inc. Rock from heading is loaded by mucking machine.



"BUCKET ELEVATOR" in new form. Diver who directs pile-driving operations and placing of sacks of concrete to seal toe of cofferdam for Marin pier of Golden Gate bridge, San Francisco, rides clamshell to reach surface.

SPHERICAL WATER TANK of 100,000-gal. capacity, on campus of Emory University, Atlanta, Ga., is supported by 100-ft. high tubular steel column 15 ft. in diameter at base, containing 8-in. riser pipe. Sphere is coated with aluminum paint while its support is painted dark green. Designed and erected by R. D. Cole Mfg. Co., Newman, Ga.



OLD BULKHEAD WALL of precast concrete blocks with granite coping *(above)*, resting on footing of concrete placed in bags, constructed by City of New York 44 years ago (1888-90), is uncovered and demolished by Allen N. Spooner & Son, Inc., inside cofferdam as part of contract for construction of three new 1,100-ft. piers in Hudson River. Divers placed footing concrete in bags on rock and guided setting of concrete blocks on footing under water. Grooves in blocks permitted chains used in placing monoliths to be withdrawn after setting; these grooves then were filled with wet concrete in bags *(left)*. Blocks were made of hand-mixed concrete, using American portland cement, which was rare at time of their manufacture.

# *Preparing Black Canyon for* BOULDER DAM

COFFERDAM construction and canyon excavation were the major features of the Six Companies Inc. operations on the Boulder dam project of the U. S. Bureau of Reclamation during the last winter. In addition to these activities, tunnel driving was carried forward on the smaller penstock and outlet bores, spillway excavations were completed and a high-level concrete mixing plant was built and placed in operation. Following river diversion on Nov. 13, 1932, the most important work on the project to insure against interruptions and delay was the building of the upper cofferdam and the major part of the earth fill was placed in a 45-day period. The concentration of equipment on excavation operations in the canyon reached a peak during February and March when on some days 7,200 truckloads of material were removed in three shifts and loaded into trains for disposal.

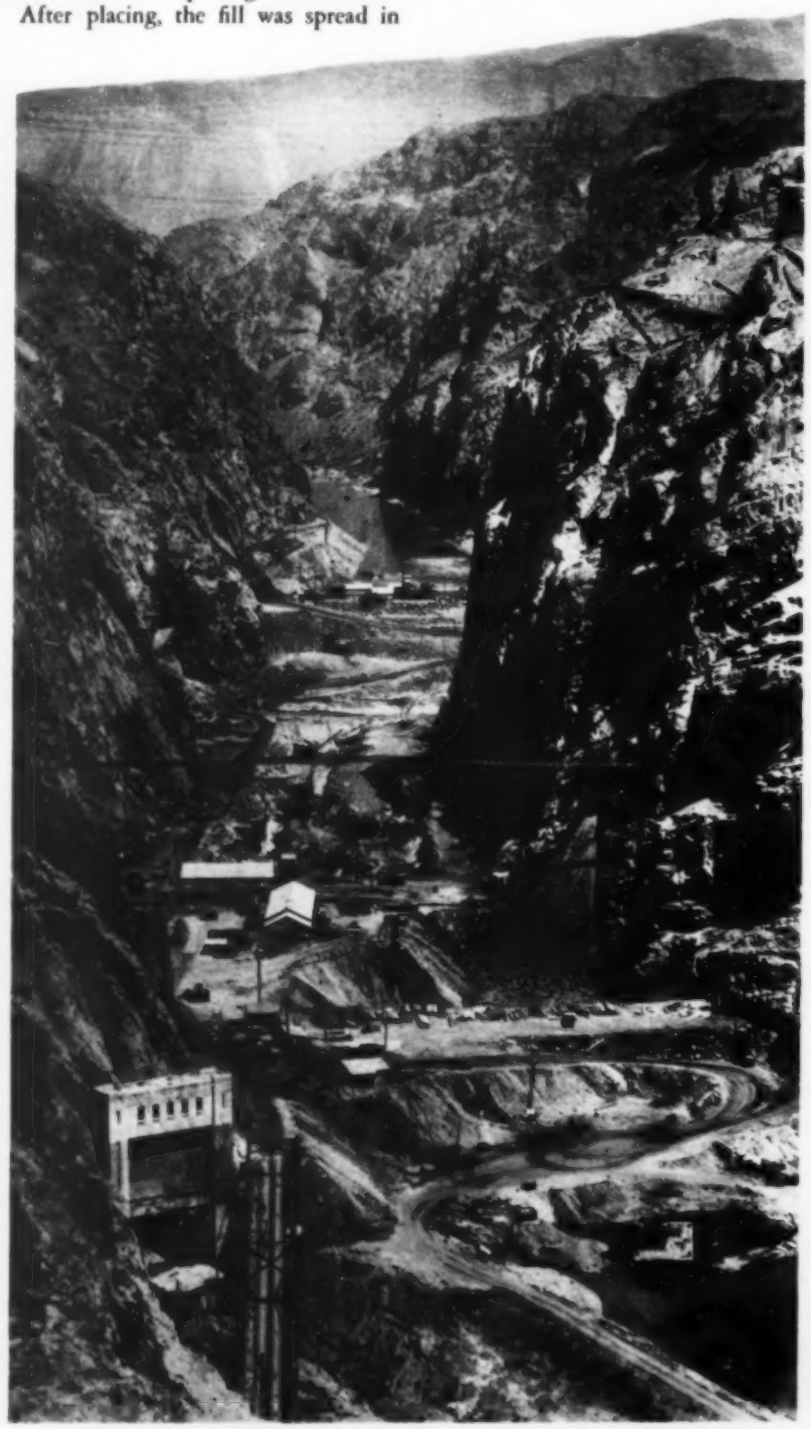
*Cofferdams*—The upper cofferdam, 98 ft. high, is a rolled earth fill with a steel sheetpiling cutoff at the upstream toe and a concrete-paved slope. Specifications required removal of the streambed deposit to consolidated material, involving an average excavation 18 to 20 ft. deep, and the bringing in of approved material to be placed in 12-in. layers and rolled to compaction in accordance with usual procedure. The upstream slope is 1 on 3 and the downstream slope 1 on 4. In addition to the earth fill the plans required a blanket of dumped rock on the upstream toe and a layer of rock covering the downstream slope. Quantities estimated for the upstream cofferdam were: Earth fill, 568,000 cu. yd.; loose rock fill, 151,000 cu. yd.; concrete facing, 3,500 cu. yd.

The lower cofferdam is of similar design, with slopes of 1 on 5 on the water (downstream) face and 1 on 2 on the upstream side. No concrete facing is provided on this structure and protection against backwash from flood flow during the diversion period consists of a rock barrier immediately downstream.

Earth-fill material satisfactory for these dams was taken from two borrow pits at the mouth of Hemenway Wash. The location was near the existing railroad into the canyon and a loop and spur were run into the pit to provide for loading. Loading was done directly into railroad cars by Marion electric shovels equipped with 3½ yd. dippers. The railroad trains consisted of seven 30-yd. side-dump cars which were ordinarily loaded with about 35 yd. of material, loose measure. These trains hauled excavated material out of the canyon and after unloading on the wide area near the river at the mouth of Hemenway Wash were loaded with earth fill for the return trip. This coordination of transportation was an important feature in the economic programming of the work.

On arrival in the canyon the trains of earth fill were dumped into a stockpile from a timber trestle and the material was sprinkled as it was reloaded into trucks for placing on the dam. After placing, the fill was spread in 12-in. layers by bulldozers on tractors and compacted by sheeps-foot rollers in the usual manner for this type of structure.

Placing of the steel sheetpiling cutoff along the upstream toe developed difficulties because of boulders in the streambed material overlying bedrock. Driving was impossible and it was necessary to excavate a trench to bedrock, set up the sheetpiling and concrete them in place at the lower end. After this the trench was filled with puddle material. This operation was carried about half way across the stream; from that point the boulders were less numerous, and it was possible to drive the remainder of the sheetpiling with a hammer operating from the boom of the 5-yd. Marion electric dragline.



WITHIN COFFERDAMS above and below site of Boulder dam foundation, excavation is in progress in bed of Colorado River. View, looking upstream, shows outlet of one of four 50-ft. diameter diversion tunnels in lower left corner.

Concrete for the facing slab was brought by mixer-body trucks from the low-level plant and handled by wooden chutes or the dragline, operating as a crane. This work involved the placing of about 3,000 cu. yd. of concrete in the 6-in. slab which was reinforced by 251,000 lb. of steel.

To provide more area for shops and equipment than was available on the original 70-ft. crest width of this cofferdam, the contractor was permitted to extend the structure upstream. This was done by first placing a 3-ft. blanket of sand over the paving slab and then dumping material from the canyon excavation to provide a level area about 400x600 ft. which was subsequently occupied by repair shops and other field structures. Completion of the cofferdam in accordance with the specifications, which required the placing of the downstream blanket of rock fill, was delayed to permit the back slope to be used as a trucking road out of the canyon.

Construction of the lower cofferdam was in general a similar procedure with material handled the same way. It was possible to use some of the streambed excavation for this structure, but otherwise the fill was brought in from the borrow pit.

*Canyon Excavation* — Excavation work in the canyon has included the stripping of the loose rock from the canyon walls, excavation for the intake towers, power plant and dam abutments and the removal of the streambed material. This work had been started on the upper levels of the canyon walls several months prior to the diversion of the stream, but large-scale stripping operations followed the drying up of the site.

Rock excavation on the canyon walls was carried on by scaling crews operating with the aid of ropes and safety lines. This work has been described and pictured in preceding issues. No new methods were developed and, although spectacular, the work was not unusual. Following the preliminary prying off of all loose and dangerous rock, the rock was drilled in successive lifts with jackhammers to bring it to the required excavation line. This work was ordinarily carried on only during the day shift because of the hazards

and the difficulty of lighting the operations during the night. During peak operations, these crews numbered 600 and about 100 jackhammers were in use. This scaled rock accumulated along the bottom of the canyon walls and was loaded with the aid of some secondary shooting, in conjunction with streambed excavation operations.

Streambed material consisted of sand and gravel with some layers of silt and had a depth along the sides averaging about 25 to 35 ft. with the central channel section depth varying from 50 to 80 ft. With the exception of some boulders, which required "plugging," this material was loaded into trucks without difficulty. Specifications required all streambed material to be excavated to bedrock between the cofferdams and the dam foundation prepared, including the removal of more than 100,000 yd. of bedrock, before any concrete could be placed.

Five Marion electric shovels, one equipped as a dragline, which had been used in excavating the diversion tunnels, were moved into this canyon area and used to load the trucking fleet. The area was large enough so that scaling on the canyon walls did not interfere with the work of the shovels and the equipment worked 24 hr. a day. Depending on conditions, the shovels were either scattered out over the area or, at times, as many as three or four might be bunched, loading rock accumulating from an abutment cut.

The trucking fleet at work exclusively on this operation consisted of about 70 to 80 units. In size they ranged from small trucks with 3- to 4-yd. bodies up to a group of 21 Mack trucks of the largest size equipped with 16-cu. yd. bodies. Servicing and repair work was carried on at extensive shops on the cofferdam.

Coming in empty to the shovels, this truck fleet was directed by two "traffic cops" so that each shovel had a sufficient number of empty trucks for its continuous operation. For the smaller trucks two swings of the shovel in about 30 sec. was all that was required for a load. After loading, the trucks moved toward the upper cofferdam and climbed the downstream face in a double line, with the faster trucks on the inside lane gradually passing the slower units on the grade. The road presented a 12-per cent adverse grade to the loads and involved one sharp turn before reaching the crest. It was three lanes wide, smooth and well sprinkled. Two lanes were used by the loaded trucks and the other lane was used by the empties.

Arriving at the top of the cofferdam, the trucks continued a few hundred yards farther to the loading dock where the material was transferred to the waiting trains. Two docks and a double track to the point of disposal were provided so there was no delay in loading or moving the trains.

From some point of vantage, such as the top of the cofferdam, these excavation operations provided a scene which would fascinate any construction man visiting the work. The constant roar of the trucks, day and night, represented a daily excavation yardage, during peak operations, totaling 7,200 loads or an average of about one truckload every 12 sec. With an average estimated load of about 5 cu. yd., this represented 36,000 cu. yd. of material excavated and moved per day. Sufficient trucks were always at hand in a steady line, and a crew of two dozen mechanics at the field repair shop were at work to keep the trucks moving. During the day the roar of this work was supplemented by the racket of dozens of jackhammers on the canyon walls. At night the drills were silent, but the excavation went forward at the same rate under floodlights which made headlights on the trucks unnecessary.

At the change of shifts operators on the various units changed places practically without the loss of time. At the half-hour lunch time, in the middle of each shift, the time was used for firing the shots, which were usually ready. The shovels were moved away

**CONTRACTOR'S RECORD OF MATERIAL HANDLED AND MOVED DURING THE MONTHS OF MAXIMUM CANYON EXCAVATION, 1932-33**

| Type of Excavation | October Cu. Yd. | November Cu. Yd. | December Cu. Yd. | January Cu. Yd. | February Cu. Yd. | March Cu. Yd. |
|---|---|---|---|---|---|---|
| Riverbed (loose) | | | | | | |
| Upstream cofferdam | 108,000 | 87,000—completed | | | | |
| Downstream cofferdam | ..... | 14,000 | 26,000 | 128,000 | 13,000—completed | |
| Dam and power house | ..... | ..... | 29,000 | 94,000 | 211,000 | 387,000 |
| Open-cut, tunnel portals | ..... | ..... | ..... | ..... | ..... | 10,500 |
| Fill Material | | | | | | |
| Upstream cofferdam (earth) | 900 | 84,500 | 420,000 | 9,600—completed | | |
| Downstream cofferdam (earth) | ..... | ..... | ..... | 2,700 | 172,000 | 24,000 |
| *Upper, lower cofferdams and barrier (rock) | ..... | ..... | 74,000 | 68,000 | 35,000 | 22,000 |
| Canyon Rock | | | | | | |
| Dam abutments | ..... | ..... | 23,000 | 76,000 | 73,000 | 57,000 |
| Wall scaling | 15,000 | 27,000 | 21,000 | 14,000 | 3,000 | 2,500 |
| Intake towers | ..... | 30,000 | ..... | 40,000 | 46,000 | 3,000 |
| Power-house site | ..... | ..... | ..... | 4,000 | 5,000 | 8,000 |
| Total excavation for month | 123,900 | 242,500 | 593,000 | 436,300 | 558,000 | 514,000 |

*This yardage of fill material is also included in the figure for "canyon rock."

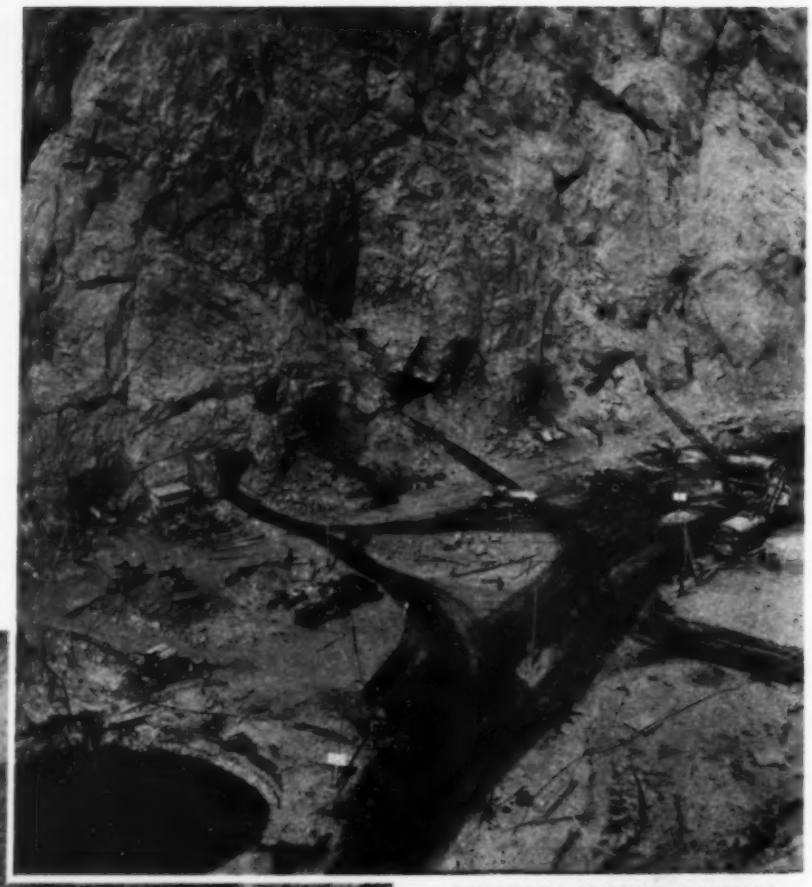
CANYON EXCAVATION is handled by electric power shovels loading material into motor trucks with special 16-cu.yd. bodies.

CONCRETE PAVING is being poured on upstream face of upper cofferdam. Completed portion of paving, at left, is covered with spoil to widen crest for accommodating contractors' repair shops.

from the location of the wall blasts and the trucks, tractors and crews retired to the crest of the cofferdam. While lunches were being consumed the usual firing preparations were made and after the familiar blast of the whistle and a few seconds of quiet, the reverberating blast brought down rock into the streambed and filled the canyon with dust. Before the dust had cleared, the tractors were already on their way down the cofferdam to clear up the road and assist in getting the shovels back to their locations. This is the nature of the operations which went forward day after day and the results can be appreciated by the yardages indicated in the accompanying table.

*Small Tunnels*—Since the completion of the four diversion tunnels, tunneling operations have been continued at a slower rate on the penstocks and outlets. The two largest units in this program are the penstock headers, one on either side of the canyon, which connect with the intake towers at the upper end and extend downstream to the power plant location where four penstock tunnels take off and farther to the canyon wall valve house where the eight smaller outlet tunnels are provided. In addition to this system, there are four penstock tunnels on each side which extend from the power house, on a level grade, to the inside diversion tunnels which will ultimately be used as penstocks with the addition of the 30-ft. steel pipes.

On the Nevada side of the river, the No. 2 diversion tunnel was available and the four 21-ft. diameter penstock tunnels about 350 ft. long were completed to the power plant site, driving from both ends. This work was carried on from a truck-mounted drilling jumbo advancing the full circle with a 14-ft. round. Mucking was done by mucking machines loading into trucks. The other four 21-ft. diameter penstock tunnels were driven on a 33-deg. upgrade to connect with the penstock header. These tunnels were drilled with an advance center heading followed by ring drilling one round behind. The muck was dragged down with a slack-line cable arrangement to a mucking machine which loaded into trucks at the lower portal for disposal into the canyon. The small 11-ft. horseshoe-shaped outlet tunnels about 150 ft. long each were driven from the canyon walls with bar-mounted drills, advancing the full face by 9-ft. rounds.

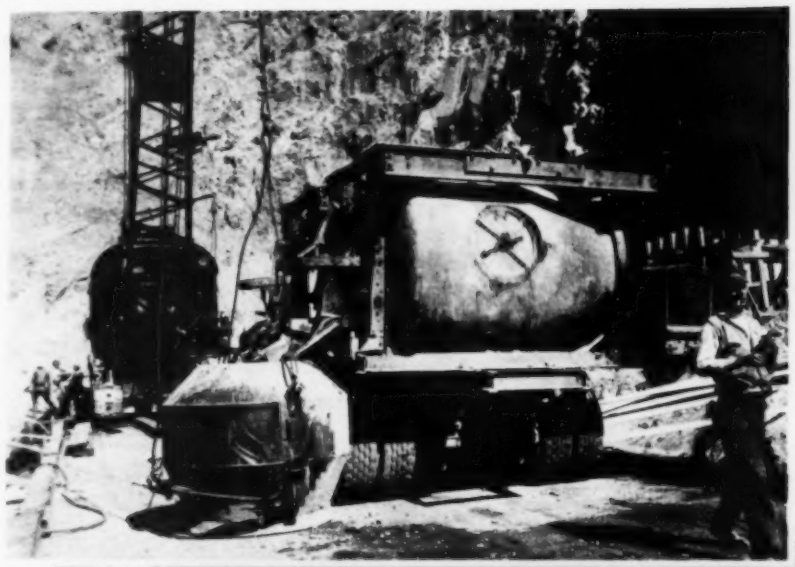


**PENSTOCK TUNNEL PORTALS** in canyon bottom lead to big diversion tunnels in which 30-ft. steel pipe will later be installed to serve as penstocks after dam is completed.

**FILL FOR LOWER COFFERDAM** is being delivered by motor trucks, spread in layers by tractor-mounted bulldozers and compacted by sheeps-foot rollers.

**POWER HOUSE SITE**, on Nevada side, is being excavated by electric shovels loading into motor trucks.

**SKIP** on 20-ton cableway is improvised from motor-truck body. Skip rider directs movement by signals.



completed, and the concreting of the overflow weirs and linings is actively under way. Concrete is being turned out at the high-level mixing plant and is being transported in 4-yd. Rex motor-mixer trucks directly to the Nevada spillway and these agitator-body units are transported across the canyon by cableway to the work on the Arizona side.

Concreting operations for the gravity section overflow weirs represent the building of small dams. Timber forms for 5-ft. lifts are placed in the usual procedure with tierods and grout outlets. The concrete is removed from the agitator bodies in 2-yd. buckets which are handled by crane to the point of placement. The concrete for these weirs contains all the aggregate up to the maximum 9-in. cobbles and is in every way similar to the mix to be used on the main dam. In addition to the overflow sections, the walls and bottom of the spillway will be lined with a 2-ft. layer of concrete.

For the U. S. Bureau of Reclamation, under Dr. Elwood Mead, commissioner, Walker R. Young is construction engineer. Field operations for Six Companies Inc. are being directed by Frank T. Crowe, general superintendent.

**TRUCK-MOUNTED MIXERS,** ***(left)*** **two 4-yd. Rex units on Mack truck chassis, climb steep grades to deliver concrete for Nevada spillway.**

Wide World Photo

**STEEL SHEETPILING is driven across canyon bottom to form waterstop at upstream toe of cofferdam.**

Access to the penstock header was provided by a 26x43-ft. construction adit which will later be used to bring in the sections of steel liner pipe. From this adit the tunnel was turned in both directions and was advanced by a rail-mounted jumbo carrying 30 drills drilling 120 holes for a 14-ft. round. This operation removed all but the 5-ft. invert section, and mucking is carried on with a 2-yd. electric shovel loading into trucks which disposed of the material through the adit. Upstream, this penstock tunnel is being driven to connect with an intake tower and, in the other direction, it is advanced to its downstream terminal at the outlet tunnels.

This same tunneling program is being duplicated on the Arizona side except for the difficulty involved at the inner ends of the penstock tunnels resulting from the use of the diversion tunnel. No lining has been done on any of these tunnels, although they will all be concrete lined and then provided with welded steel pipe.

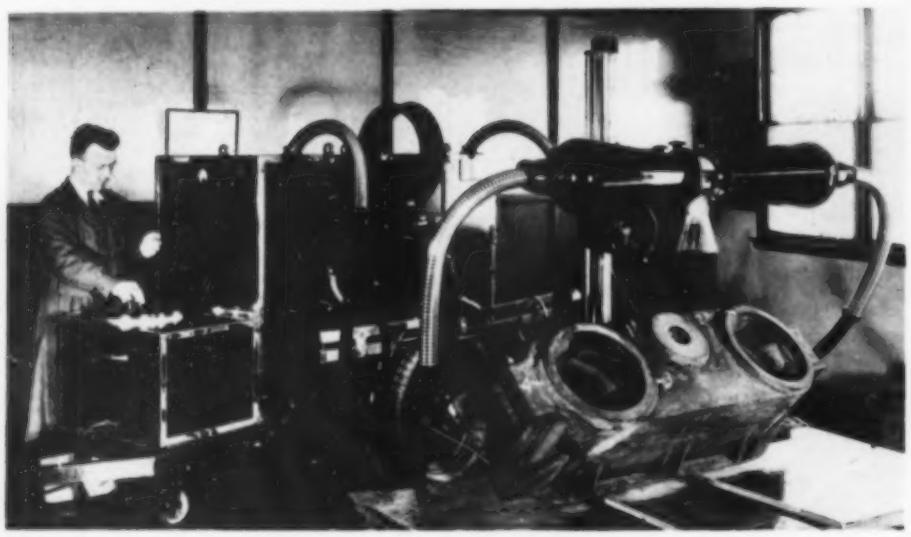
*Spillway Concreting*—The two huge spillway cuts involving the removal of 300,000 cu. yd. of solid rock have been

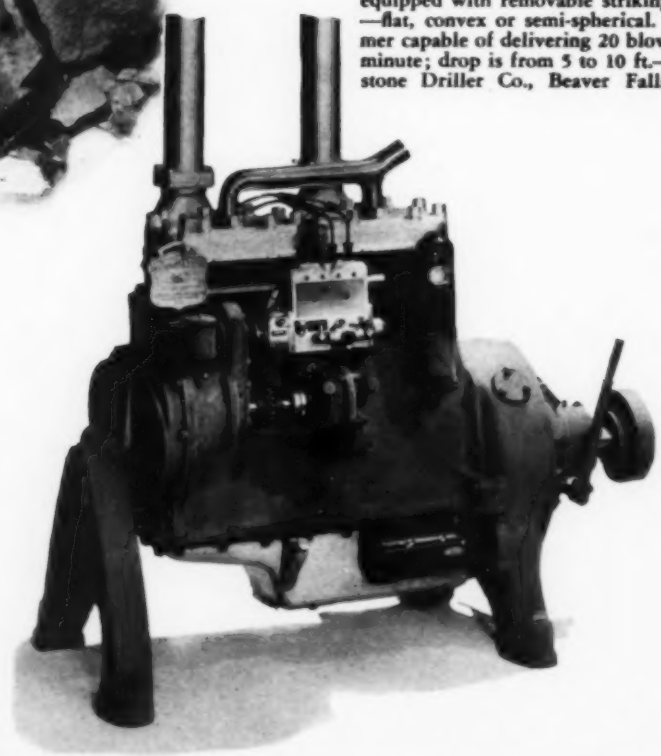
**SPILLWAY WEIR** ***(right)*** **on Nevada side receives concrete transferred from dual 4-yd. motor-mixers on single truck to bucket on crane boom.**

# New Equipment *on the Job*

**3,000-LB. POWER DEMOLITION HAMMER** for breaking reinforced concrete pavements, ice or frozen earth crust; demolishing small structures, fences, walls and parapets; breaking castings in scrap yards, foundries and steel plants; breaking shale and sandstone bodies too hard to dig; tamping; driving short piles, fence posts, etc. Consists of hammerhead rigidly attached to 8-ft. long tubular handle hinged to boom end of convertible shovel and equipped with removable striking face —flat, convex or semi-spherical. Hammer capable of delivering 20 blows per minute; drop is from 5 to 10 ft.—Keystone Driller Co., Beaver Falls, Pa.

**PORTABLE INDUSTRIAL X-RAY EQUIPMENT** *(below)* for determining quality of raw materials prior to their manufacture and for revealing defects heretofore hidden from surface inspection. Philips Metalix machines X-ray wood, steel, metal, concrete, clay products and textiles. Made in three sizes, all of which can be connected directly to 220-v. a.c. outlet or to 440-v. power main. Use of largest size unlimited. Other two sizes will examine iron up to 3½ in. thick; copper, bronze and brass up to 2½ in., and aluminum up to 10 in. Safety features: (1) Only primary useful beam of X-ray emits; harmful rays are absorbed. (2) Simplicity of design precludes use of high tension wires.—Industrial X-Ray Corporation, Chamber of Commerce Bldg., Los Angeles, California.

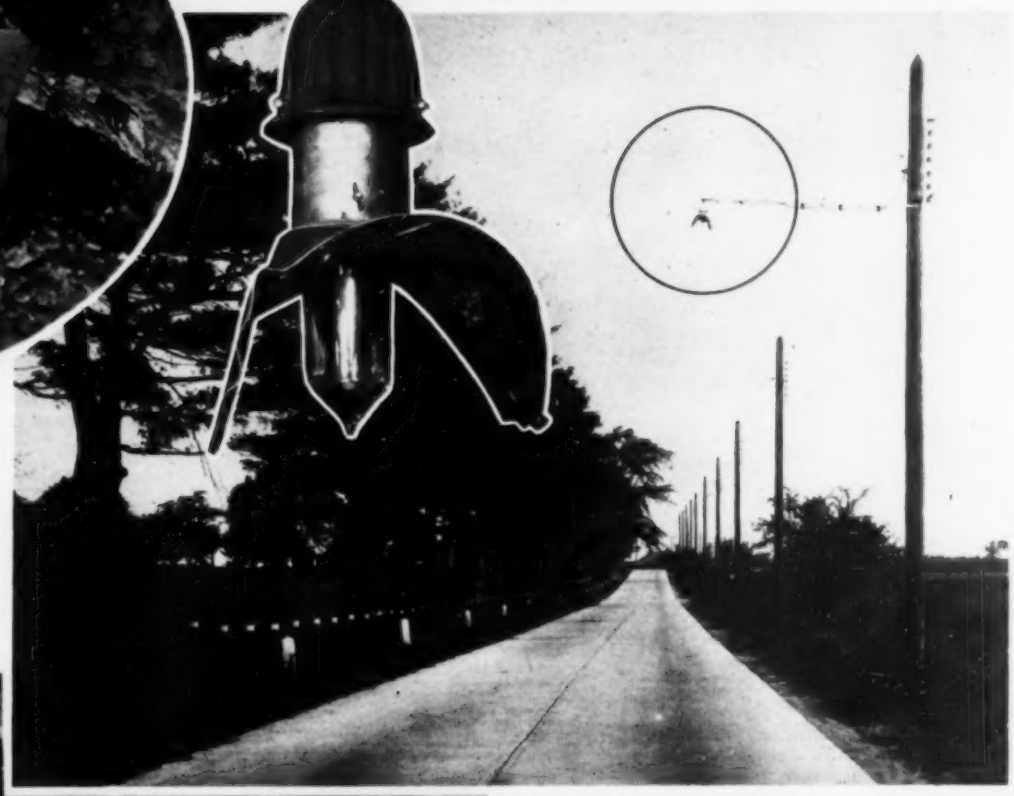


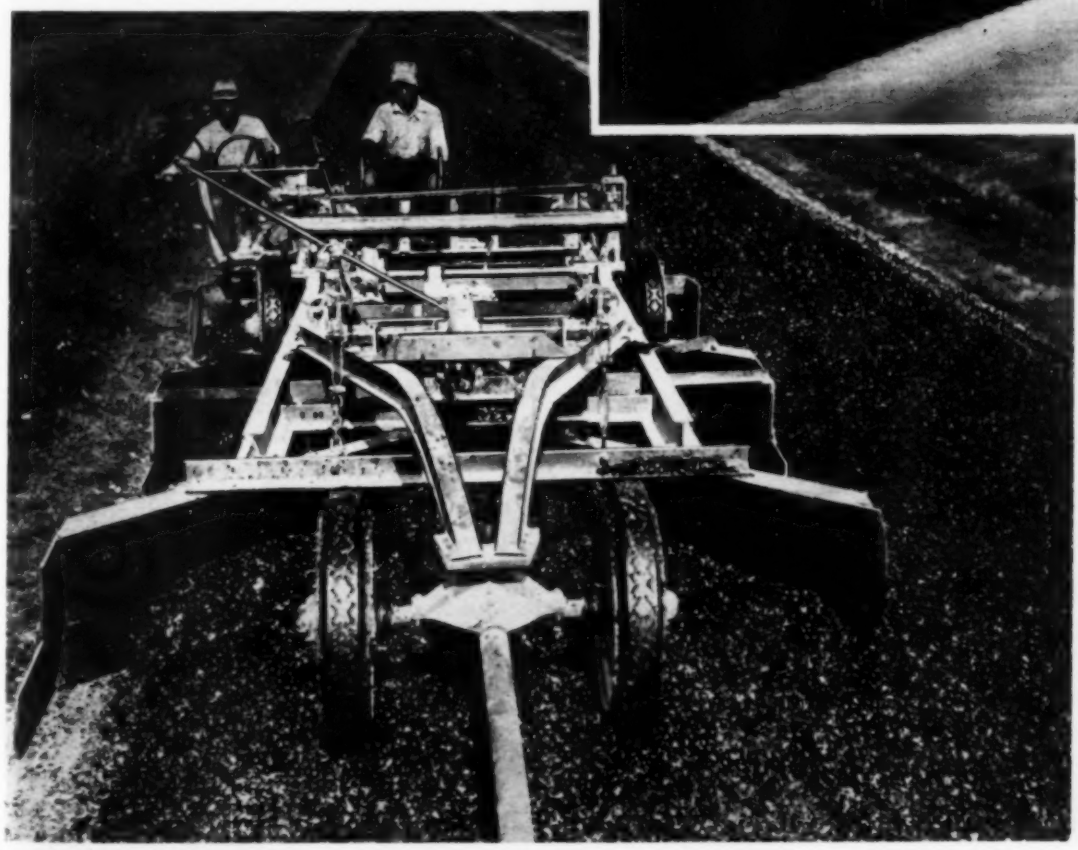


**MONOVALVE DIESEL ENGINE** uses only one valve per cylinder and permits use of conventional L-head design. Four-cylinder engine is designed to operate at rated speed of 1,200 r.p.m. and develops 75 hp. at this speed. Fuel consumption at 75 hp. is .44 lb. per hp. hour. Since engine torque curve is so flat and fuel consumption so complete, engine has speed range of from 200 to 2,000 r.p.m. and still gets clear exhaust and fuel consumption of less than .5 lb. per hp. hour, making available horsepower ranging from 35 to 125. Made in sizes from one to eight cylinders. Parts on all sizes standardized, simplifying service and replacement— American Diesel Engine Co., Oakland, Calif.

NEW TYPE BULLDOZER *(right and below)*, called "Angledozer," capable of working at any angle to tractor's line of travel, has been perfected as snow removal machine or as adjustable bulldozer for contractor's use. Chief characteristics: ease of adjustment to any angle of throw and any angle of blade pitch; light weight; ability to work in continuous line, without backing, in moving snow off highway or pioneering road along hillside. Machine has high lift—4 ft. above track level—and a low drop—6 ft. below track level. Time required to change angle of blade 20 min . Weight 4,200 lb.—R. G. Le Tourneau, Inc. Stockton, Calif.

FOR ROAD-MIX BITUMINOUS WORK. Adams retread paver *(below)* with three sets of mixing blades and an independently controlled rear leveling blade will mix aggregates four times in one trip instead of once as does a single blade machine. Leveling blade may be set to spread material to exact width, depth and crown ready for rolling. New feature is steerable rear truck which enables operator to hold to perfectly straight edge, and to facilitate proper distribution and finish on superelevated curves. Works in stone, gravel or slag and with any bituminous material. Machine will complete mile of road a day.—J. D. Adams Co., Indianapolis, Ind.





SODIUM VAPOR LAMPS FOR HIGHWAY LIGHTING are being tried at Schenectady where, under joint sponsorship of General Electric Co., and New York Power & Light Corp. 22 units have been installed on half mile of road. Lamp consists of gaseous discharge device 7 in. long and about 3 in. in diameter mounted in "thermos bottle" to conserve heat and maintain sodium at about 480 deg. F. Electric current is carried through lamp by gas instead of by filament. Arc in lamps is red when current is turned on but becomes yellow as sodium pressure increases. At first glance light appears dim but seeing is made easier by reduced glare and monochromatic or one-color character of light which reveals details of objects at low levels of illumination. Sodium lamps for the same wattage input give about 2½ times light output of incandescent lamps. Lamps are equipped with "floppy bonnet" type reflector *(insert)* designed to put light on road rather than in all directions. Lamps are turned on automatically by photo-electric control.—General Electric Co., Schenectady, N. Y.

***If You Want Further Information—***

**Within the space limits of this page it is impossible to present complete information about the products illustrated.**

**The manufacturers, however, will be glad to supply further details if you will write to them.**

# Present and Accounted For—

## *A Page of Personalities*

Harris-Ewing Photo

PUBLIC WORKS ADMINISTRATOR. By order of President Roosevelt last month Harold L. Ickes, Secretary of the Interior, was appointed administrator of the $3,300,000,000 public works program provided for in the National Industrial Recovery Act, succeeding Col. Donald H. Sawyer, temporary appointee.

Harris-Ewing Photo

PUBLIC WORKS DEPUTY. Col. Henry M. Waite, former chief engineer of the Cincinnati Union Terminal Co. and city manager of Dayton, Ohio, has been named deputy administrator of public works, under the National Industrial Recovery Act.

TENNESSEE HIGHWAY COMMISSIONER. Frank W. Webster *(below)*, of Nashville, has been promoted from maintenance engineer to the commissionership of the Tennessee highway department, with which he has served since 1917.

Katden-Keystone Photo

CONSTRUCTION CODE ARBITER. Malcolm Muir, president of the McGraw-Hill Publishing Co., has been appointed by Gen. Hugh S. Johnson to serve as deputy industrial administrator of the Recovery Act. He will preside at hearings on the code of fair competition for the construction industry.

WYOMING STATE ENGINEER. James B. True *(below)*, former city engineer of Cheyenne, has been appointed state engineer of Wyoming and in that capacity will also head the state highway department, succeeding C. H. Bowman, resigned.

# A Fleet of Rex Moto-Mixers, 21 in All, was Chosen for Handling the Concrete on the World's Longest Bridge . . .

Because of the exceptional performance of a fleet of 17 Rex Moto-Mixers at Boulder Dam, for Six Companies, Inc.

And also because of several years of successful operation of a fleet of 21 Rex Moto-Mixers operating in San Francisco and Oakland Bay Territory.

So, naturally the Kaiser Paving Company choose Rex Moto-Mixers to mix all the concrete—which they will furnish to the contractors on the San Francisco-Oakland Bay Bridge.

Also, following the outstanding performance of Rex-Stearns Idlers in the aggregate plant of Boulder Dam—these idlers were chosen for the 28 Belt Conveyors that will make up the conveying equipment on the job.

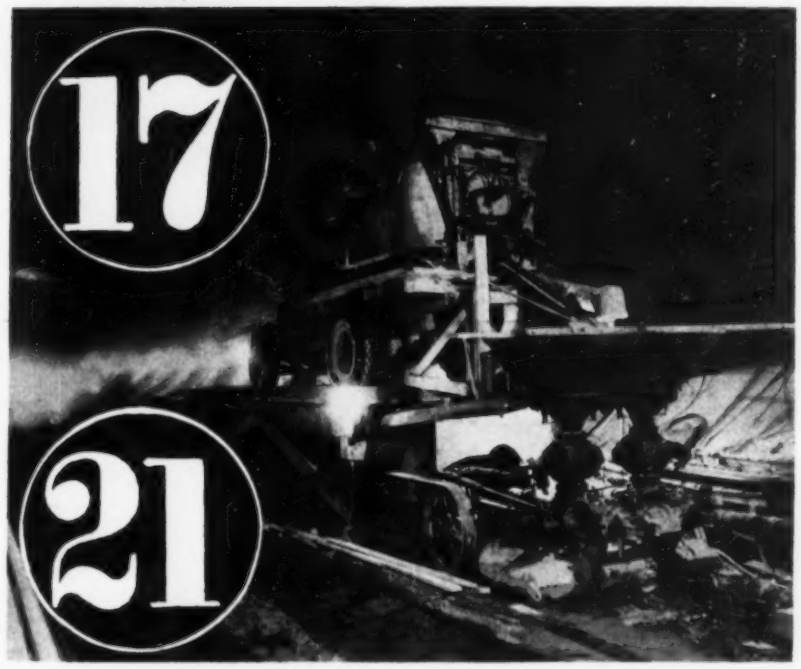
On the San Francisco-Oakland Bay Bridge, all the concrete will be handled in Rex Moto-Mixers—all the aggregates will move over Rex-Stearns Idlers.

CONTRACTORS: Before you buy—or bid, INVESTIGATE the Rex '49ers—the 49 complete machines built for the contractor by

**CHAIN BELT COMPANY**
**Milwaukee, Wis.**

A Rex Moto-Mixer feeding the Rex Pumpcrete—the pump that pumps concrete—in one of the tunnels at Boulder Dam.

*Below:* Night view of the aggregate plant at Boulder Dam showing the many galleries in which Rex-Stearns Idlers operate.



THE REX '49ers

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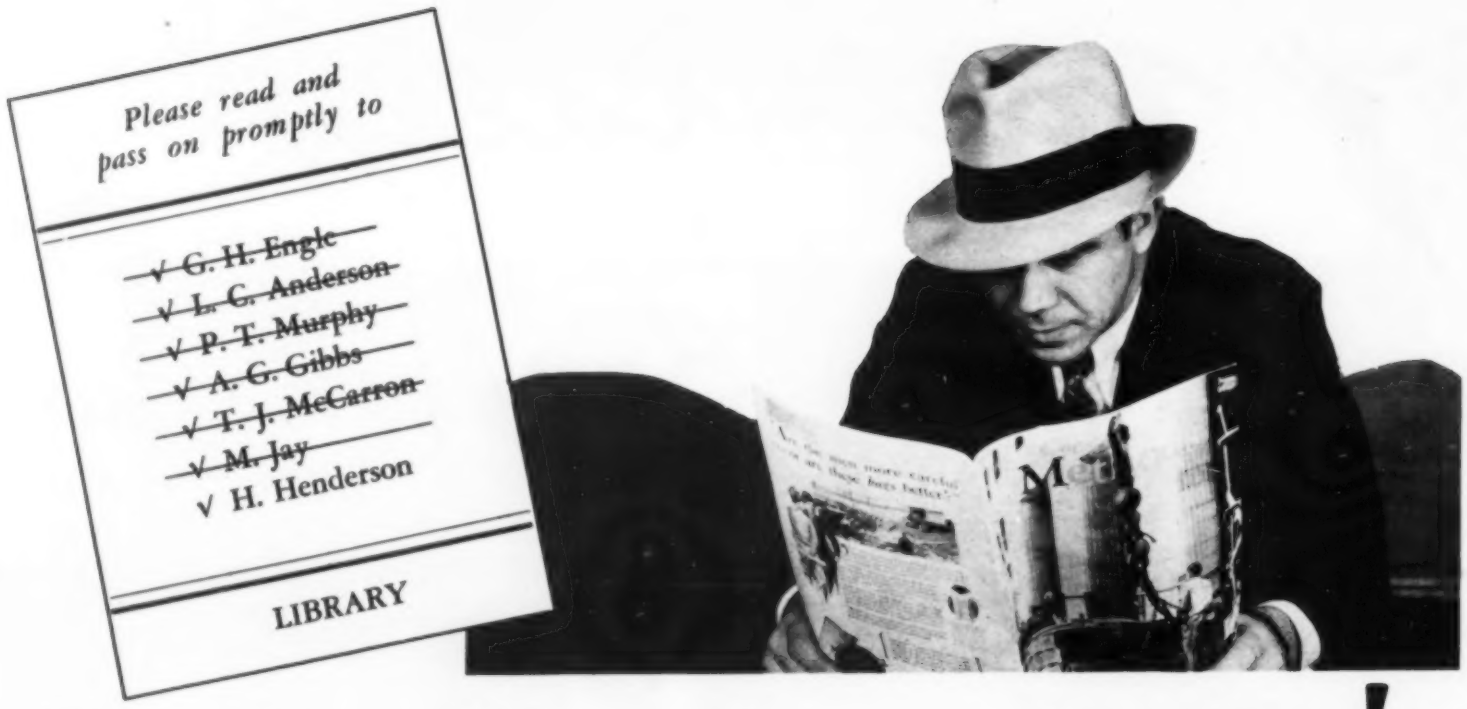
*Western Office:* 900 Harrison St., San Francisco, Calif.
*Main Office:* 1664 W. Bruce St., Milwaukee, Wis.
*Distributors in All Principal Cities*

**REX CONSTRUCTION EQUIPMENT**




# He Was Seventh on the List!

## Yet He Was Responsible For the Job

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Each month CONSTRUCTION METHODS brings you new ideas on:

—how to use old equipment in new ways.

—how to save money on the job.

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"The chief has an idea he is saving money by having seven men read one copy of Construction Methods. Just how wrong he is, can best be told by relating an experience I had on the job we have just finished.

"Here it is:

"To complete the road building job I was on, it was necessary to use a scraper slightly larger than the one on the job. After 5 hours' delay a scraper was rented for $75 and the job completed.

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"I'm tired of having the copy reach me, weeks late, and with pages missing—all because someone 'on the list' thoughtlessly clipped the magazine. To stop all this, use the enclosed $1 to enter my name on your subscription list for the next 12 months."

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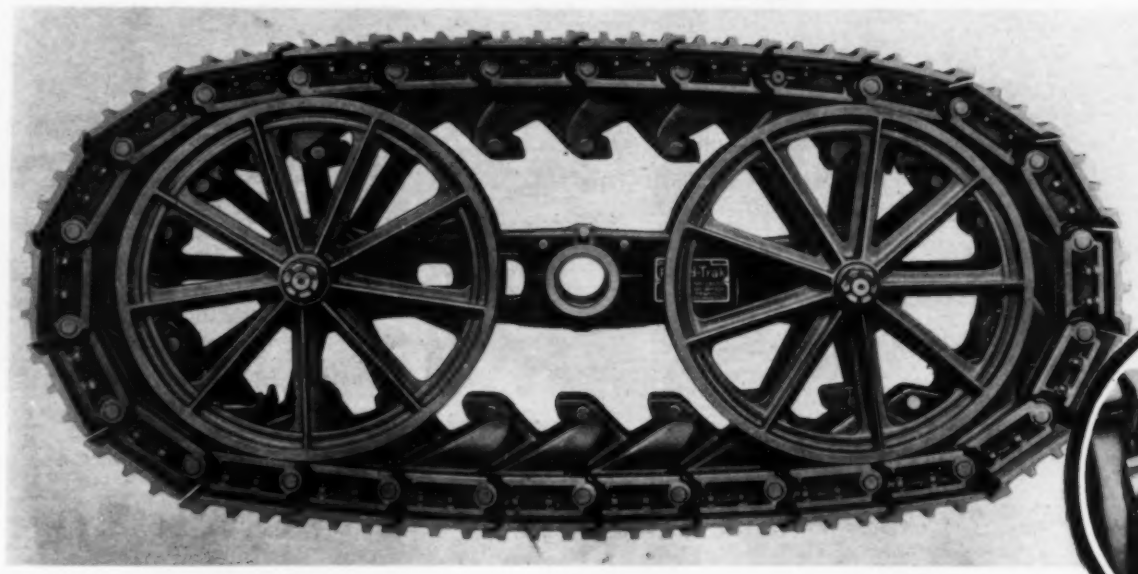
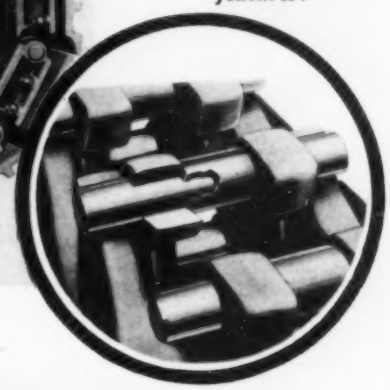
## The Greatest Forward Step Ever Taken To Give You LOWEST Hauling Costs



*FLOATING Lock Pins provide maximum bearing surface and lengthen pin life. These floating pins permit easy rebuilding in the field after long service. Just ONE of the many exclusive ATHEY features!*



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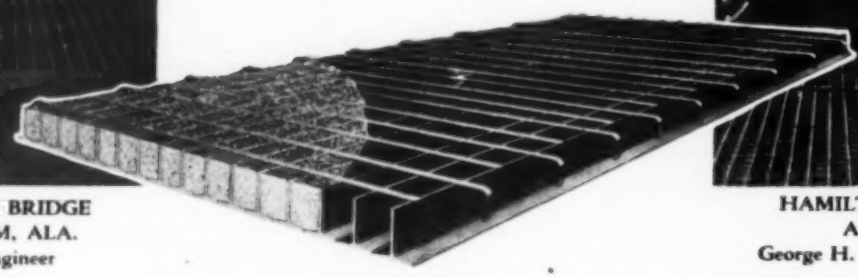

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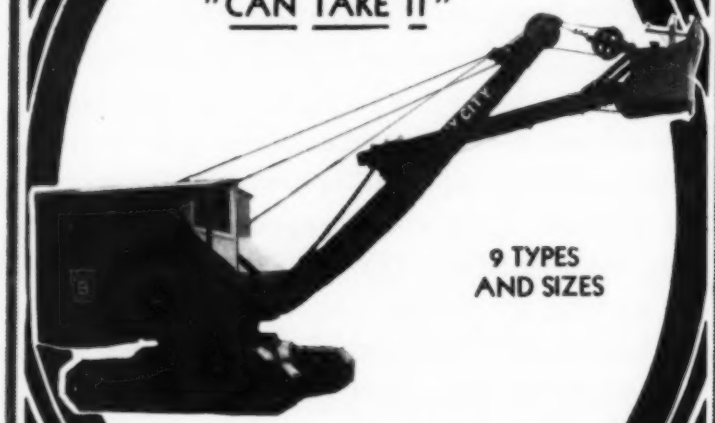

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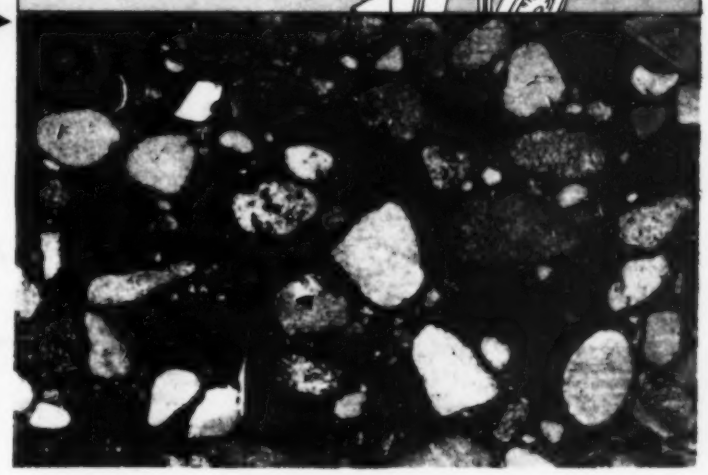

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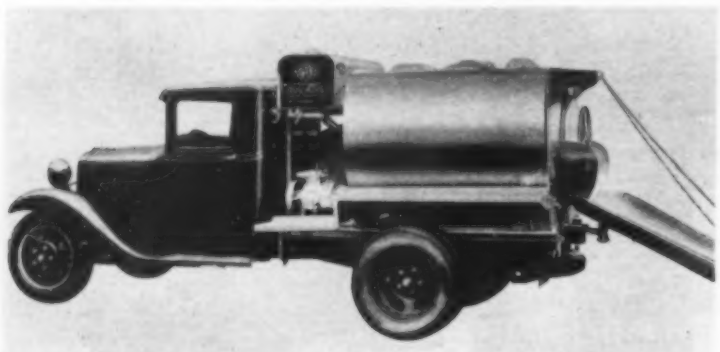

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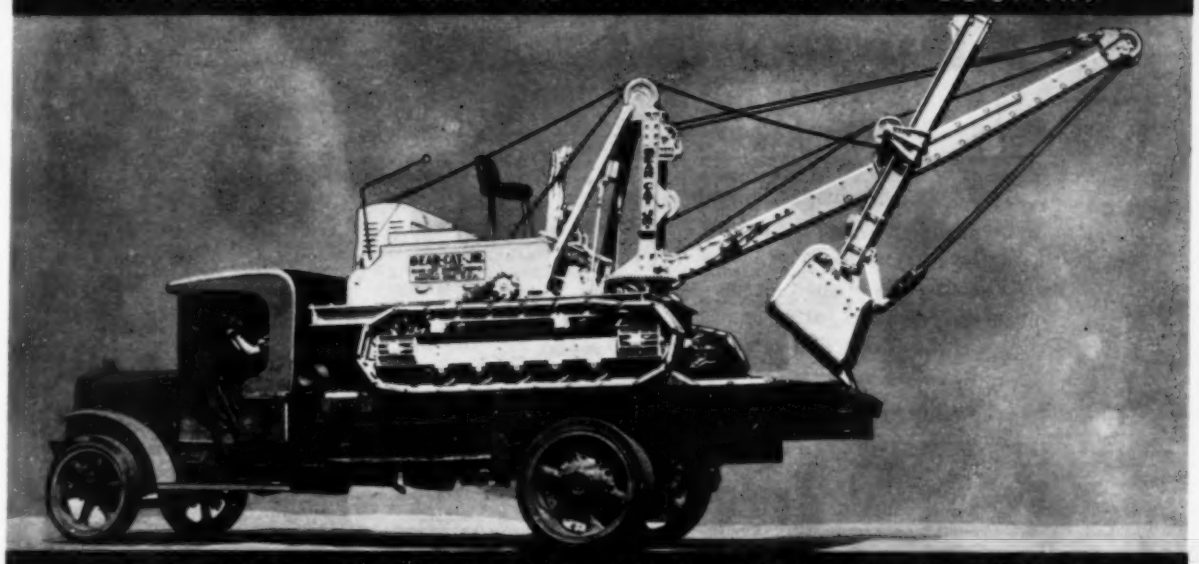

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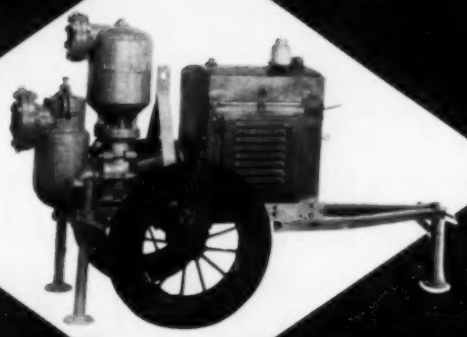

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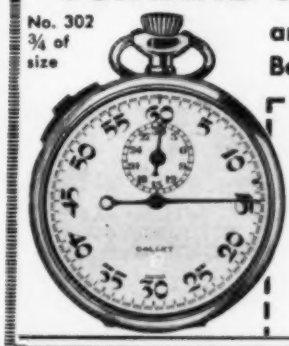

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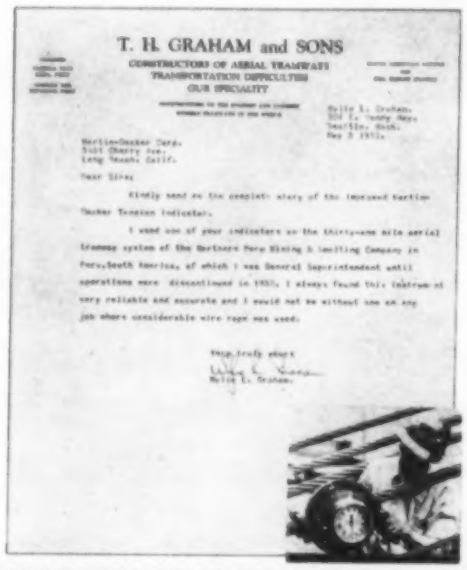

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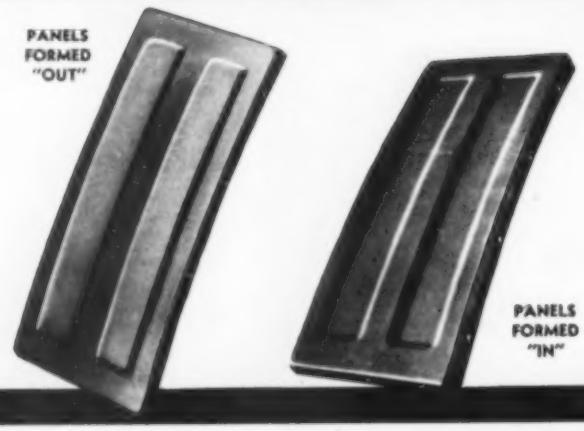


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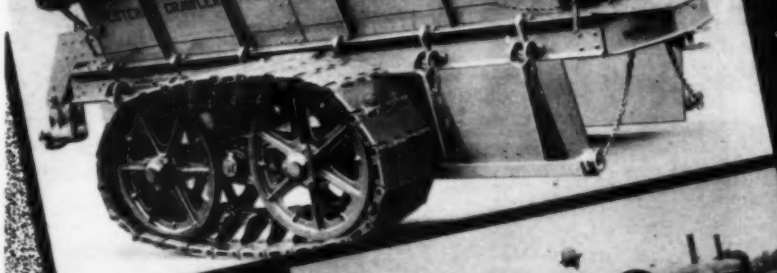

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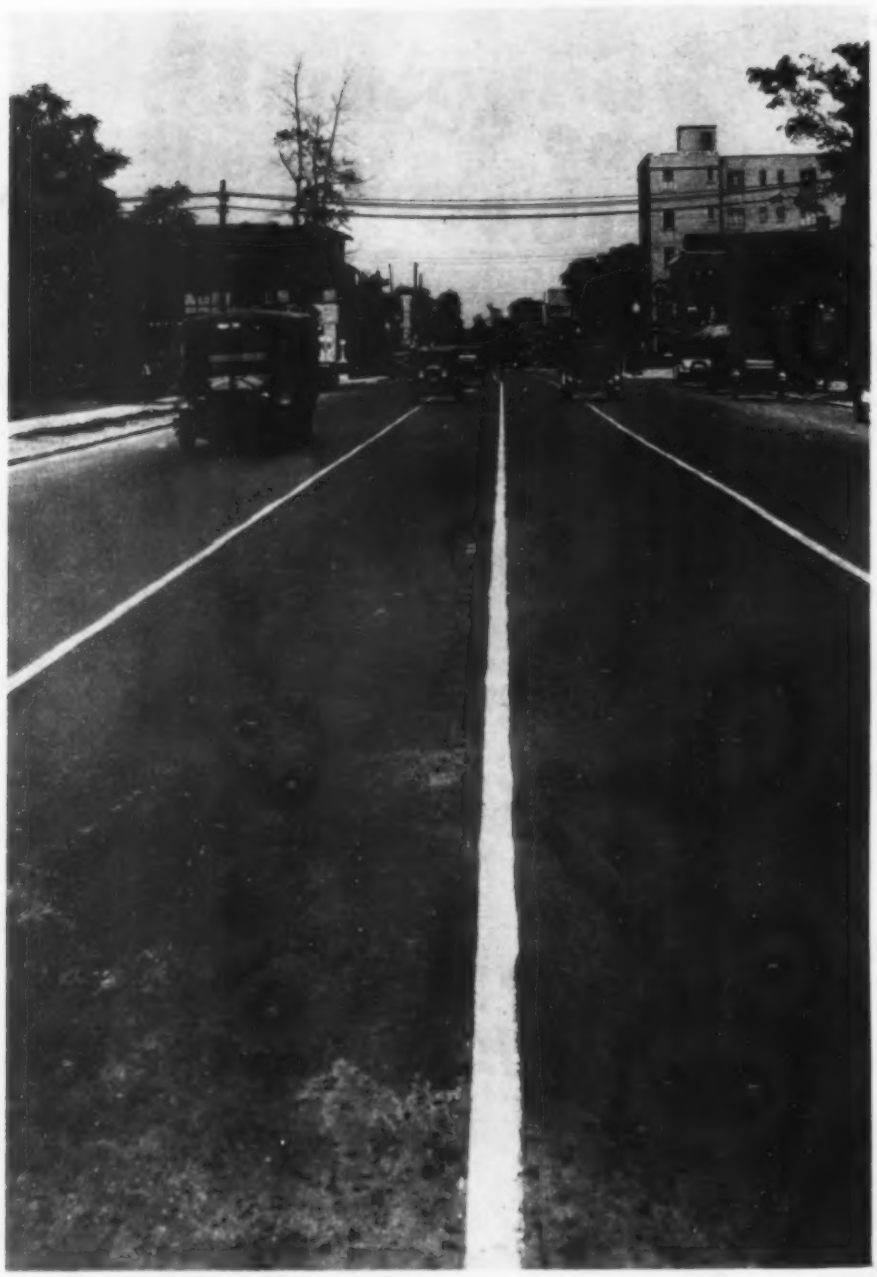

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